The TROPICAL AGRICULTURIST MONTHLY.

XXI. COLOMBO, OCTOBER 1st, 1901. No. 4.

TROPICAL TIMBERS AND THEIR RINGS OF GROWTH.

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[*Especially written for Indian Gardening and Planting.*]

THERE is probably no more interesting study in timbers than that of the seasonal elements which a transverse section of the stem exhibits. The majority of persons are familiar with the historical tables usually attached to, or painted upon, the successive annular rings of stem sections in the museums and gardens of Europe. The validity of the idea that each ring counts for a definite period of time in the life of the plant is accepted as sound, though in past times much controversy was waged on the nature of the causes producing these time-checking arrangements of the timber elements. The bark pressure theories of Sachs and T. Hartig, the theory of osmotic variation waged by Russow, and the ideas of Weiler and Robert Hartig, respecting nutritive supplies to the tree, were all found insufficient to explain the nature of the causes which determined the formation of rings of growth. It was left to the genius of Strassburger and his contemporaries to explain the formation of the rings in terms of the varying physiological needs of the plant.

In temperate zones the deciduous trees burst into new foliage during spring, and the main function which the wood has to perform. is that of supplying copious quantities of water to the growing leaves. This is accomplished by the production of large lumined, thin walled elements, which form connected systems from roots to leaves. During autumn the demand for water is not as great, but there is an increased weight of plant tissue, and the necessary elements to give support and rigidity are added in the form of narrow elements possessing very thick walls.

The thick walled narrow elements of autumn abut directly on the large elements of the next spring, and hence the line of demarcation showing the limit of growth for any particular year is often very conspicuous. The idea that each ring represent one year of time is therefore correct for those trees in temperate zones which exhibit such periodicities in leaf production. In the tropics, however, where as many as four seasons have each a recognised power, and the arborescent vegetation is often characterised by more than one periodicity in leaf production per year, the time represented by each ring of growth is not necessarily one year,

It is obvious to a casual observer that the very great differences between the periodicities in leaf production of the Flamboyant and Cotton trees, or those between the Candle, Almond and Para rubber trees, or better still between an evergreen having no fixed periodicity and a deciduous tree having the annual regularity of Schizolobum excelsium—such differences must result in the production of very dissimilar tissue arrangements in the wood o the respective trees. We therefore see that in order to correctly interpet the " seasonal " rings of growth we must know exactly the characteristic periodicity and, since the climate and vegetation in the tropics are as widely different from those of temperate zones, we may expect the problem to assume some degree of complicity.

In tropical countries such as Ceylon, where the air is hot and damp throughout the year, the majority of trees are usually considered to be of an evergreen nature. Many of these ever-greens, such as species of Cinnamomum and Eugenia, Mangoe

and Jak, etc., have no fixed periodicity, and new leaves may occur any month in the year; others produce leaves at a definite time each year, and of this class the most conspicuous are the ebony trees. Further, it is worthy of note that those trees of Diospyros embryopteris and Diospyros Gardneri, which as yet have not produced sexual organs, are invariably characterised by a biannual foliar periodicity. A comparison between the rings of growth of a young ebony—not flowering—and one regularly producing flowers, should therefore prove highly interesting. Next to the evergreens we may for comparison place those trees which drop their old leaves simultaneously, but which have produced leaf buds prior to the fall of the old ones, as in Dillenia indica, Rhopalocarpus lucidus. etc. Many others however, have gone a step further, and the production of new leaves is delayed until the greater part of the old leaves have dropped and the tree assumes a semi-bare condition, as in Ficus Trimeni. Continuing in this direction we come next to those trees which, like the Inga saman and Candle, are bare for a few days, and finally to those like Erythrina umbrosa, Careya arborea, Bombax, Hevea brasiliensis, Dalbergia frondosa, Plumieria acutifolia and a host of less familiar trees which remain leafless for several weeks or months during every year.

There are very few species in Ceylon which drop their old leaves and produce new foliage more than once per year, a notable exception being the almond —Terminalia catappa.

Not only does the foliar periodicity vary with the species, but trees of the same species exhibit great variability, and it is even doubtful whether the the same tree produces new leaves at exactly the same time from year to year. These differences must be due either to the varying personal requirements of the plants or the environment under which they exist.

In studying the personal equation of the plant one cannot but conclude that one of the foremost objects in dropping the leaves is to check excessive transpiration. In the Peradeniya districts and in all those parts of the island which feel the dry heat of the N.-E. Monsoon, many of the deciduous trees drop their leaves before or during the hottest months —February to April and thereby avoid a condition of transpiration which might otherwise prove fatal. The noteworthy examples are Crataera Roxburghi, Erythrina indica, Ficus Arnottiana, Sterculia balanchos, Schizolobium excelsum, Oroxylum indicum, Cupania edulis, Antiaris innoxia, the Cotton and Para and Ceara rubber trees and many others familiar to the tropical tourist. That this is one of the prime objects is further indicated by the behaviour of Careya arborea, Eriodendron aufractuosum, and others in the Bibile and Batticaloa districts, since in these places the production of new leaf is delayed considerably—an obvious advantage where the S.W. Monsoon is replaced by hot dry weather. If it were necessary to bring proof in support of this idea, one need only point out the behaviour in desert areas where those plants, the tissues of which are neither fleshy nor protected by hairs or other contrivances, drop their leaves prior to a period of drought. The zerophytic plants having leaves which either in virtue of their succulence retain for a long time the greater part of the water they have obtained, or are so protected by hairs, wax, cuticle, sunken stomata, etc., that loss of water by transpiration is at a minimum, such plants remain ever green throughout the hottest months. The plants not so adapted must necessarily drop their leaves in order to prevent excessive loss of water. In temperate zones a reversion is seen, since it is during the cool months that the trees become bare, and only when heat and sunshine present their maximum strength that the arborescent vegetation puts on the best show of leaf.

One of the reasons why, in temperate zones, the trees drop their leaf in winter is probably to be found in the fact that the soil is so cold that absorption cannot take place through the roots, and hence no supply being guaranteed, the plants lose their foliage until the warmer weather arrives.

Though the checking of transpiration seems to be one object, it is rather surprising to notice the comparative zerophytic nature of the leaves of Ficus Arnottiana, Ficus Trimeni, and others where the transpiration is probably much less than that from the tender leaves of Brownea grandiceps, and yet the former are deciduous and the latter is evergreen. Further, we have to face the difficulty that the hottest part of the year is not that chosen by all the deciduous trees, as is instanced by the behaviour of Albizzia procera and Dalbergia frondosa, which become bare in the Peradeniya districts during the dull wet month of July when transpiration cannot be at all excessive. But what is still more difficult to bring into conformity with the theory of checking transpiration is the production of abundance of fresh foliage when the dry heat of the N.-E. Monsoon is asserting its maximum power. This occurs with trees of Sclerocarya caffra and Terminalia melanocarpum during the hot month of March, and similarly Sterculia balanchos and Chlorocylon Swietinia in April. It is highly probable that many of these trees have, in the migration of species, found their way into districts where the climate is not in agreement with their old periodicites. They may, or may not, acquire a new periodicity, and it would be important if we could determine whether the periodicity of imported species grown from seed remains the same as in the native districts. One might also notice whether a species, native of our country, shows the same periodicity as locally grown trees when introduced again from abroad.

Many of the peculiarities will probably have to be explained on purely personal grounds, since they do not lend themselves to correlation with known environments. The power of the personal equation can be better studied in the tropics than in temperate zones, since the variation of season has such a preponderant influence in the latter areas.

Many instances are known which point to the operation of purely individual forces within the plant. In *Java et ses Habitants*, by I. Chailley-Bert, mention is made of the fact that trees of the same species of Palaquium are growing side by side and under conditions almost identical, and yet one may be bare at a time when the others retain full possession of their foliage.

Mr. Nock also informs me that the English oaks grown at Hakgala under a comparatively temperate climate behave in the same irregular manner. This individual variation cannot be better studied than at Peradeniya, where Lagerstroemia flos-regina, a native of the moist lowcountry of Ceylon, grows in abundance. Here, in the month of February, one tree was perfectly bare and yet others only a few yards distant were in full foliage; others were about to drop their leaves, and during the same month one had not only dropped its foliage, but burst into new leaf and followed this by production of flowers. Similarly with trees of Bridelia retusa, also a native of the moist lowcountry. So much then to indicate that internal factors may be at work in determining periodicity of leaf production.

On the other hand, there is considerable evidence in the acclimatisation of trees that the power of environment is very great. A moment's consideration of the powerful influence of a temperate climate on the phases of vegetation is alone sufficient. There are instances which seem to point to the possibility of a new periodicity, without the loss of the old one, being produced by a change of climate. Here we must content ourselves with a few examples which indicate the power of climate. One case of

more than usual interest is given by Dr. Watt, Vol. I., p. 46, where the behaviour of Acacia dealbata, Link, indigenous to New South Wales, Victoria and Tasmania, has been entirely changed by the climate in the Nilgiris. The facts are, that in 1845 and up to about 1850, the trees in the Nilgiris flowered in October, which corresponded with the Australian time, but about 1860 they were observed to flower in September; in 1870 they flowered in August; in 1878 in July; and in 1882 they began to flower in June, this being the spring month in the Nilgiris corresponding with October in Australia. It therefore takes nearly 40 years to regain its habit of flowering in the spring, i.e., to become perfectly acclimatised *(Ind. For.*, VIII., 26*)*.

I am also informed that the English oaks now growing at Johannesburg further illustrate this point, since they begin to drop their leaves towards the end of May, remain here until near the end of Augnst, when new leaf appears, to be followed by flowers which ripen into fruit by Christmas.

These are very striking examples, and what we are particularly anxious to obtain is a satisfactory table of comparison showing the behaviour of the deciduous trees under different climates. The importance cannot be overestimated, as we shall obtain one string of facts which, together with some knowledge of the rates of growth of the plants in question, will materially assist us in our attempt to interpret the seasonal peculiarities of tropical woods. Having in view the innumerable side issues to which such a problem may lend itself, we confine ourselves to the following points:—

I.—When the plant drops its leaves.
II.—When the new leaves appear.
III.—When the flowers appear.

A list of those plants which are deciduous in Ceylon is now appended in the hope that all interested will forward as much knowledge as they possess respecting the behaviour of any or all of these plants; Albizzia stipulata, Borr; Albizzia Lebbek, Benth; Albizzia procera; Benth.; Antiaris toxicaria, Lesch.; Anogeisus latifolia; Acacia suma, Kurz.; Aleurites triloba, Forst.; Alstonia scholaris, Br.; Adenanthera bicolor, Moon.; Bombax malabaricnm, D.C.; Bassia longifolia, L.; Bauhinia; Bridelia retusa, Spreng; Cratæra Roxburghii, Br.; Cochlospermum gossypium, D.C.; Cassia multijuga, Rich.; Cassia grandis, Lf.; Cassia nodosa, Ham.; Cassia fistnla, L.; Clerodendron Thomsonae, Balf.; Cedrela serrulata, Mig.; Cedrela odorata, L.; Careya arborea Gaertin.; Chickrassia tabularis, A, Juss.; Chloroxylon swietenia, D. C; Canthium macrocarpum; Cupania edulis; Citherexylum cinereum, L.; Couroupeta guianensis, Aubl.; Derris robusta, Benth.; Derridalbergiodes, Baker.; Digellostyles axillaris; Dipterocarpus zeylanicus, Thw.; Dipterocarpus hispidus, Thw.; Dalbergio melanoxylon, G. and P.; Dalbergia frondosa, Roxb.; Dilenia indica, L.; Eriodendron aufractuosum, D. C.; Enterlobium cyclocarpum, Grisib Erythrina indica, L; Erythrina ve[illegible]tina, Willd,; Erythrina umbrosa, H.B.K.; Eugenia jamb[illegible]na; Ficus religiosa, L.; Ficus Trimeni, King; Ficus Arnottiana, Mig.; Ficus Wightiana, Wall; Ficus infectorea, Roxb., Ficus semicordata, Mig.; Ficus elastica, L.; Ficus altissima, Bl.; Flacourtia Ramontchi, L. Herit; Gmelina arborea, Roxb.; Hevea brasiliensis, Muell Arg.; Heterophragma adenophylla, Seem.; Litsea sebifera; Lagerstrœmia flos-reginae, Retz.; Lagerstrœmia tomentosa; Manihot Glaziovii. Mull.; Michelia champaca, L.; Oroxylon indicum, Vent.; Odina Woodier, Roxb.; Pithecolobium saman, Benth.; Pericopsis Mooniana, Thw.; Poinciana regia, Boj.; Plumieria acutifolia, Poir.; Pterospernum semisgittatum, Ham.; Phyllanthus emblica, L.; Pahudia Javanica, Mig.; Peltophorum Leunei, Benth.; Peltophorum ferrugeninm, Benth.; Pterocarpus echinatus Pers.; Pterocarpus marsupium, Roxb.; Pterocarpus indicus, Willd.; Parmentiera oereifera, Seem.; Pityran the verrucosa, Thw.; Parkia biglandulosa, W. and A.; Phopalocarpus lucidus, Boj.; Spondias mangifera, Willd.; Sapindus laurifolia, Vabl.; Sclerocarya caffra, Sond.; Sterculia Balangas Schizolobium, excelsum, Vog.; Sterospermum Xylocarpum, B. and Hkf.; Sterospermum cheleniodes, D. C.; Sterospermum suaveolens, D.C.; Schleichera trijuga, Willd.; Stephegne tuberosa; Saccocephalus esculemus, Afz.: Sapium biglandulosum; Swietenia Mahogany, L.; Styrax Benzoin, Dryand.; Terminalia catappa. L.; Terminalia belerica Roxb,; Terminalia melanocarpum, F. M,; Terminalia parviflora, Thw.; Terminalia chebula.; Tectona grandis, L.; Tabebuia Pallida Lindl.; Tamarindus indicus, L.; Vitex Leucoxylon, L. F.; Vitex altissima, L. F.; Xanthoxylon Rhetse Yizyphns glabrata, Heyne.

QUESTIONS FOR CACAO PLANTERS.

(*To the Editor, " Tropical Agiculturist."*)

Sir,—I heard some time ago that Mr. Carruthers and Mr. Huxley were compiling a set of questions which it might be hoped cacao planters would find it in their interest to answer for the purpose of enabling Mr. Carrnthers in particnlar, and everyone in general, to obtain some reliable information, or at least to enable such to be deduced from replies which would be elicited. This was some time ago, and I personally have received nothing up to date of the kind. In view of this I venture to send you a list of questions, for publication if you think fit. By the medium of your paper, in which—for the discussion of planters' interests you have given already, from time to time, considerable space—a publicity would be obtained for a subject, that needs considerably more light on it than we have at present.—Yours, &c.,

P. O. D.

Moneragalla, Angust 24th.

(Questions for circulation among Cacao Planters.)

District
Aspect (N., S., E., W., &c.)
Date (year)
Maximum and minimum elevation
Heavy rainfall per annnm
Wettest monsoon (quote months)
Principal cropping season (quote months)

I.—Varieties.—1. Is Forastero or Caraccas in your opinion the more remunerative?
2. Quote any particular variety or hybrid doing especially well with you?
3. At about what elevation is yonr best cacao?
4. What coloured flowers in your opinion mature best?

II. Canker.—1. How do you treat for canker (*a*) by light shaving, (*b*) deep cutting, or (*c*) any other methods.
2. Do you destroy diseased shavings and pods: if so how?
3. Do you treat systematically? if so, state length of round?
4. In what months is canker most prevalent with you?
5. What was the original environment of your worst cankered fields?

III. Suckers.—1. Do you grow suckers from the base or lateral branches, or both? and what are their respective effects on the tree?
2, Do you encourage suckers with any idea of immunity to canker?
3. Are you satisfied with them on this or on any other count; if so, what?

IV. Manure.—1. With what do you manure, if anything?
2. How do you apply it?
How much per tree?
4. Any improvement in appearence, or what increase of crop?

*V. Pruning.*1—Do you prune either old or young cacao?
2. Lightly or heavily?—for crop, ventilation, &c.? —for spread or shape?

VI. Helopeltis.—1.St Sate your method of treatment.

2. Length of round.
3. Length of time under treatment.
4. When most prevalent.
5. With what result, satisfactory or otherwise?

VI. Shade.—1. What shade do you prefer if any?
2. At what distance for new clearings?
3. At what age would you thin out, and how, if at all?

VIII. Crop.—1 What is the annual average yield of pods per tree on your cacao in full bearing? State Caraccas or Forastero (hybrid mixed, &c.) and approximate age.
2. What proportions of good and black cacao do you get?
3. To what do you attribute any variation of these proportions throughout the year?

INSECT PESTS.

CIRCULAR TO FRUIT GROWERS.

The Secretary of the Department of Agriculture has caused a circular letter to be sent to all the Societies in the State, of which the following is a copy:—

"I beg to draw the attention of your Society to the recently amended regulations under 'The Insect Pests Amendment Act, 1898,' and more particularly to the new Regulation 20, governing the use of second hand fruit cases, which reads as follows:

"The use within the State of second-hand fruit cases or packages that may reasonably be supposed to have contained fruit is prohibited, and the Chief Inspector or Local Inspector may order the disinfection of same, as provided in Order 11, or by any other means that may be directed by the Secretary of the Department of Agriculture, and failing such distinfection shall seize and destroy same.

"Experts are agreed that the use of second-hand fruit cases, without being disinfected, is one of the surest methods of disseminating disease. This being so, it behoves everyone interested in the horticultural advancement of the State to prevent the use of second-hand cases as far as possible, unless they have been previously disinfected.

"In accordance with the expressed desire of recent Producers' Conferences, the Department has, in order to discourage the use of second-hand cases, obtained the co-operation of the Railway Department in the matter of differential rates being levied on new cases imported or locally made, and second-hand cases.

"The material for cases in shooks can be obtained in Perth, subject to slight market fluctuations, at the average price of 8s. 6d per dozen.

"Not only is it in the interests of growers to discourage the use of second-hand cases, but also to encourage the use of an uniform case, and it stands to reason that, the contents being good, the more attractive the manner in which fruit is marketed the higher will be the returns.

"A new and uniform case, the distinctive individual brand of the shipper, an attractive address-label, and careful grading and packing, will secure a maximum return and drive the worthless fruit out of the market—it is carelessness and rubbishy fruit that brings down the average—and, while ensuring to the grower a better profit, will also ensure to the consumer a cheaper, because a better, and a more regular supply of the best fruit.

"Now local growers have to compete against the Eastern States, it is imperative they should attend carefully to details.

"No matter how careful the inspection at the port of entry, experts are of opinion that the danger of introducing diseases new to this State will always be present, and this knowledge should stimulate the local growers to exercise the greatest vigilance in preventing the possible introduction of diseases into their orchards.

"The saving of a penny or so per case, by using second-hand cases, may be the means of introducing into an orchard a disease that may cost hundreds of pounds to eradicate, if it does not finally render the orchard worthless.

"This Department, as you are doubtless aware, has only four Inspectors to supervise over four thousand widely-scattered orchards and vineyards, and I am appealing to your Society now to appoint from its membership, one or two, or three or more—as you may think fit—honorary inspectors, who will assist this Department in administering the Insect Pests Act. It is in your own interests I ask you to assist the Department. You have now to face the competition of the Eastern States in fruit and diseases, and you can only successfully do this by exercising eternal vigilance in keeping your orchards and vineyards free from disease, and the best way to do this is to follow the lines indicated;—

"1. Plant vigorously, but only the best varieties, having an eye always on the export trade of the future.

"2. Cultivate thoroughly and prune properly, and do not starve the trees if a little fertilizer will help them.

"3. Spray carefully and often, remembering that a single spraying is seldom of much use.

"4. Allow no second-hand cases to come on to your place. If they do disinfect at once.

"5. In the interests of your neighbours send no second-hand cases away unless disinfected.

"6. Ship only the primest fruit turning the rest into jam or pork. Either will pay you better than spoiling your own market by supplying rubbish. "It is an ill bird that fouls its own nest."

"7. Pick grade, and pack as if yow were handling eggs, and use only new cases, branded with the name of the orchard, and legibly addressed on an attractive label, to your agent.

"If you decide to appoint honorary inspectors, in the different centres of your district, as I hope you will, I will endeavour to secure them any actual out of pocket expenses they may incur in the execution of their duties.

"Remember 'Eternal vigilance is the price of success."

"I have the honour to be, Sir
"Yours obedient servant,
L. LINDLEY-COWEN,
"Secretary."

—*Journal of the Department of Agriculture Western Australia.*

GOOD AND BAD CASTILLOA.

(*Translation of an Article in the Journal de Agriculture Tropicale, July 1901.*)

Castilloa is the rubber-tree par excellence of Mexico and Central America. The innumerable companies for rubber-growing formed lately with North-American capital have the *Castilloa* always in view. From this we may conceive the very strong interest which attaches to the communication translated herein. It is extracted from a German pamphlet * appearing early this month, and from which we shall have occasionto borrow still further. The author, Mr. Th. F. Koschny, has been a settler on the Rio de S. Carlos (Republic of Costa Rica) for nearly twenty-five years. He is certainly a most observant man; Professor Warburg, in his book on *Castilloa* and its culture, quotes him on every page; Mr. Koschny is in fact a most devoted correspondent of the Tropenpflan-

* Th. F. Koschny:—Die culture des Castilloa-Kautschuks. In 8d.; 50; published as a Supplement (Beiheft) of the Tropenpflanzer, that admirable review of Tropical Agriculture, of Berlin.

zer, the review directed by Mr. Warburg. Nevertheless, Koschny does not seem to be a botanist; on this side matters seem to require some controlling by some one in this line of business. Mr. Koschny moreover mentions that he sent to the Botanic Gardens of Berlin samples of all the parts of the species and varieties he refers to; so that we shall not he long without attaining a fixed idea of the distinctions and assimilations he establishes.

Several authors have already distinguished species and varieties in the genus *Castilloa*; all the information on this point will he found in the French edition of the *Plantes a Caoutchouc* of Warburg now being brought out in serial form by Challamel (that excellent colonial publisher, 17 rue Jacob, Paris.)

This edition has been executed under our supervision; we have provided it with a great number of annotations completing the original text and putting the facts in their trne light. In particular, on what concerns the species and varieties of *Castilloa*, we have made a resnme of all tbat is known up to date of Koschny's new monograph; even the facts set forth below will be found indicated in our book, as the outcome of anterior communication with Koscbny, bnt less precisely.

All this goes to say that the reader with a real interest in getting accurate information as to the *Castilloas* to cultivate and the *Castilloas* to avoid would do well not to rest content with the statements he will find below, but to re-perurse also the corresponding paragraph of our edition of Warburg. It would be a waste of available space were we to reprint that paragraph here; and there is no necessity for doing so, for the book will be on sale in a few days.

In the text which follows, we shall see that we have four sorts of *Castilloa* to deal with. The catalogues of dealers in seeds and tropical plants only comprise two:—

1. *Castilloa elastica*, without distinction of varieties;
2. *Castilloa Tunu*, this last *Castilloa* being of quite recent appearance.

The last list of seeds and plants distributed in the German colonies by the agency of the "Kolonial-Wirtschaftliches Komitee" of Berlin, mentions the *Castilloa alba*; this is probably seeds coming from Koschny.

After this preamble, here is what Koschny says:—

"I know here four sorts of *Castilloa*; three seem to belong to the "species *elastica*, the fonrth to the species *tanu*. * Here are the native names of these four sorts of *Castilloa*:—

Hule (pronounced Oule) Blanco; translation: white rubber-tree; as a scientific name I propose for this variety, that of *Castilloa alba*.

Hule Negro; blackrubber-tree; I propose to call it *Castilloa nigra*.

Hule Colorado; red rubber-tree; I propose to call it *Castilloa rubra*.

Hule Tanu; the people of the country call it also gutta percha; its scientific name is *Castilloa tanu*.

"The four sorts of Castilloa I have just ennmerated are identical or nearly so as regards the exterior aspect of the branches, pseudo-branches" (for the explanation of this term, see the Chapter *Castilloa* in our edition of Warburg.—Editor's Notes), leaves, &c.

"The hase of the trunk of the Castilloa presents folds or tabs of which the height varies from thirty centimetres to two metres according to the age of the tree. We call these prolongations of the trunk here *Gambas* (limbs); they correspond to the thick roots which run along the surface of the soil or immediately under the surface. The three varieties of *Castilloa elastica* have these *gambas* thick, with the upper edge slightly rounded; with the *Tanu*, on the contrary, the *gambas* are thin and their upper edge more acute.

"1. Hule Blanco (*Castilloa elastica* var. *alba*.) Seen from a distance the trnnk shews glimmers of white and red. The white colour is due to a white lichen, very delicate, which causes no injury to the tree.

"The very old trees have the hark covered with heavier mosses and lichens of a dull colour; and then it becomes almost impossible to distinguish them from the other forest trees: the underwood prevent one from seeing the crown of the *Castilloa*, and the Hulero (rubber-gatherer) as likely as not goes by without suspecting the presence of a rubber-tree, unless by chance he finds some of its leaves on the ground; these are as a fact bigger than those of most of the forest trees, and moreover may be recognised by their rolling themselves up into tubes as they dry.

"The latex of the Hule Blanco is thick. When we tap the tree, only a part of the latex follows the track of the gutter and reaches the receiver, unless one guides it with the finger to make it take the exact direction desired; under natnral conditions, nearly half of it sticks in the incisions themselves.

"The Hule Blanco is, of the three varieties of the *Castilloa elastica*, that most frequently met with in the mixed forests; it is the only one worth the trouble of cultivation. Its bark and its bast are thicker and at the same time softer than those of the other varieties. The Hule Blanco is never met with in the high forests; it prefers the places rather thinly grown, where its crown can be sufficiently exposed to the air, while at the same time its stem is shaded hy the undergrowth. It is the Hule Blanco which stands wounding best; it is the tree which gives the most caoutchouc with the least risk of premature exhaustion; this thanks to the property in its latex of coagulating within a short time. By sticking in the furrow and cracks of the hark the latex of the Hule Blanco begins by giving a mass quite soft, like thick cream, which would at once be washed off were it to rain at that moment; but should a dry wind be blowing at the time of tapping, the solidification of the latex would be produced so quickly that next morning its condition would quite defy the rain. At the end of from six to eight days, according to weather, the transformation into caoutchouc is complete.

"Hule Negro. The hark of this variety is dull in colour and very much furrowed. It is rich in latex; but as the latter is very watery, its flow easily becomes excessive and the tree dies of exhaustion. The bark of the Hule Negro is a little thinner than that of the Hule Blanco, but it is very fibrous and resistant. This variety is certainly shade-loving and only to be found in high forest. Its bark resembles in every respect that of the common trees of the forest; for this reason Hule Negro is very difficult of detection when one is traversing the forest. The cultivatioh of the Hule Negro cannot be recommended, on account of its tendency to die when wounded. This tree is generally to be found mixed with other *Castilloas*. All the same, it is perhaps the least common variety; most likely because being particularly sensitive to wounds it must have succumbed before the other kinds to the hrutal methods of exploitation of the hulero.

"3. Hule Colorado, '-red-rubber-trees.' It is the hark which shews the reddish tinge, especially that of the branches. It is smooth, thin, and brittle; its fracture is conchoid; the edges of the channel made for its bleeding have a tendency to open out and burst. The yield of latex is scanty; still the caoutchouc is of good quality.

"The hark of this variety has so little resemblance to that of the others that one would hardly recognise the tree as a rubber-tree were it not for the identity of its general form, the shape of its crown

* Editor's Note. Botany only knows *C. Tunu*; this difference of spelling is unimportant; but what is strange is the discrepancy as to the quality of caoutchouc furnished by the tree in question.

of its ramification, foliage, &c. As a matter of fact, while the bark of the Hule Blanco and Hule Negro splits in the longitudinal (vertical) direction, that of the Hule Colorado is smooth but presents quite a curious aspect by virtue of the light furrows running over it in a very oblique direction. By these furrows the bark of the Hule Colorado appears as it were garlanded. These garlands or ribbons have yet another peculiarity: they are ornamented with little round knobs, disposed in vertical and horizontal series. At a given moment, these knobs break up; they then contribute towards making the bark take on that general reddish discoloration characteristic of the Hule Colorado. Apart from these oblique furrows, this be-ribboned arrangement, and these knobs, the bark of the Hule Colorado is absolutlely smooth, without the least fissure, if we except the twigs and young branches of which the bark has not yet taken on its final form. The bark of the Hule Colorado is much thinner than that of the two preceding varieties; the bast is scarcely developed at all.

This variety is found everywhere mixed with the others, both in the high forests and in the mixed; as a rule it is rarer than the Hule Blanco; still there are places where it predominates. I should not be surprised if the poor results of *Castilloa* cultivation in Java and Ceylon were due to their having unsuspectingly planted this worthless variety. Should it turn out that the Java and Ceylon cultivation has been of the Hule Colorado, the relative check to this culture would be explainable by the fact that this variety is much more shade-loving than the Hule Blanco; now it is very likely that in those islands the Castilloa may have been grown without any shade." *

"4. Castilloa Tanu. This tree is called Tanu by the Mosquito Indians; the huleros call it *gutta percha*. The bark is very like that of the Hule Blanco, but rather greyer in colour; to distinguish this Castilloa from its three fore-runners, the easiest feature is that offered by the prolongations of the base of the trunk *(gambas)*, which are more salient, much slenderer and with the upper edge more acute. This Castilloa does not exist in the valley of San Carlos; † it is only to be met with starting from the outskirts of Blewfields (on the Mosquito Coast) and further to the north; on the Pacific slope there are certain places where the Tanu is very frequent.

"The leaf and all the bearing of the tree suggest the Hule Blanco; the latex is very abundant, but in drying it resinifies and hardens; as for elasticity, this so called caoutchouc is no-where"

About Castilloa Tunu, Hemsley.

Just as we are going to press we receive from Mr. Godefroy-Lebeuf to whom we had communicated Mr. Koschny's study, a note in favour of the *Castilloa Tunu*, Hemsley. Mr. Godefroy-Lebeuf works out in a more circumstancial fashion the idea expressed by us in our annotations on the account of observations published by Mr. Koschny under the title "Good and Bad Castilloa." We cannot do better than reproduce just as it stands the letter of Mr. Godefroy-Lebeuf.

"We must not scatter discredit on the Castilloa Tunu, Hemsley. Should all the Tanu's or Tunu's of Costa Rica be deemed unfit for any purpose, the *Castilloa Tunu*, Hemsley, will still stand out as a most excellent caoutchouc, equal to the best Castilloa rubbers.

"This species has been determined by Hemsley chiefly on the specimens of my collaborateur, Eugene Poisson, who has brought back from Costa Rica not only herbarium specimens but samples of latex and of caoutchouc drawn from this species.

"That the tree known in Mr. Koschny's country as 'Tann' or 'Tunn' gives bad caoutchouc is quite possible, but the plant is undetermined botanically. Is it alone a Castilloa?

"There is another proof of the good quality of Hemsley's Castilloa Tunu, in the care taken by planters to use this kind alone. Mr. Eugene Poisson, now actually in France, can give us more definite information.* It is unfortunate that Koschny did not accompany his particulars with botanical specimens; one cannot trust to simple descriptions. The genus *Castilloa*, notwithstanding the small number of species described, is terribly mixed. Where does Castilloa elastica begin? Is *Castilloa Markhamiana* a true species? Is *Castilloa australis* distinct from the Costa Rica species?

"I only know one thing, and that is that the *Castilloa Tunu* of Hemsley gives an excellent gum."

A. GODEFROY LEBEUF.

PINE CULTIVATION.

There has been a very great interest taken of late in Pine Cultivation. Pines have always been grown more or less in Jamaica, but given very scant attention, and comparatively few have been shipped abroad. Since good hopes of a direct line of fast steamers, especially fitted to carry fresh fruit between Great Britain and Jamica, were first held out, there has been a considerable planting of pines, and since the "Direct Line" became a certainty, still greater attention has been directed to pine cultivation as a probable source of profit. There have come to Jamaica men from Florida who were engaged in the growing of pines there, and who have taught us a great deal in better ways to deal with the plants; at the same time they have also learned that they had to adapt their ideas to Jamaica conditions as these are in many ways different to Florida. These Floridians also brought with them suckers of pine-apples new to Jamaica, some of which may be very useful to us. Oh, it is easy to plant pines! says somebody. Of course it is; it is also just as easy to plant bananas, cocoa, or oranges, that is, by just sticking them in holes in the earth: but there are also ways of dealing with all plants that are expected to produce as high a return of a marketable product as possible, that will tend to this end, while the merely sticking in process will always give only a precarious change of producing something. Now in dealing with Pines we have first to choose the land. Pines will grow almost anywhere, but if the land is not naturally dry such as around Kingston, and on the plains on the south side, it is best to have a natural drainage and so the best plan is to choose sloping land; the freer the soil is naturally, the better, although some varieties of

* *Editor's Note.*—The discussion as to whether Castilloa should be grown in the sun or in the shade will be found fully set forth in Mr. Warburg's book; but besides that we shall give, in a coming number, some more extracts from Koschny's pamphlet. He is a decided advocate of shade.

† *Editor's Note.*—Where the author has his property.

* *Editor's Note.* Our mutual friend, Mr. Poisson Junr., has just returned to Paris after a long and difficult journey of exploration; agricultural and commercial, through Dahomey. We would ask him to spare a few moments from his well-earned rest to give the readers of the Journal d' Agriculture Tropical an account of how he collected the specimens of leaves, fruits, and caoutchouc which have served Mr. Hemsley in his description of Castilloa Tunu in the 'Icones Plantarum' of Hooker.

2. Unless we have mis-read the German text, which by the way is none of the clearest, Mr. Koschny has sent botanical specimens of his Tunu to the Botanic Gardens of Berlin. The 'Tropenpflanzer' will no doubt let us have the result of their study, which we will duly notice.

Pine-apples seem to delight in stiff soil, for on such land are they found growing naturally wild. The land must always be well drained, if not naturally, then artificially. You would, of course, fork or plough your land first: digging little holes and sticking the plants in, is no good at all, for remember, that it is not simply a fruit that is to be produced; it is a good sized fruit that will stand a Journey, be attractive and have a good chance of fetching a fair price. The soil must be made loose, but not necessarily to any great depth as the pine is a surface feeder; still the soil must not be only scratched loose for an inch or two; the ordinary depth of a foot fork is a suitable depth to dig. Having forked the land, it will be all lumpy and rough; the sun and breeze will dry it up, and then the rains will partially crumble it down: it is therefore well to commence on your land a month or two before you mean to plant; you can assist this fining process by going over the land with an Assam fork, and smashing the clods, thereby making the soil smoother and more level. Of course if a plough and cultivator and harrow can be used, the land will be ready so much the quicker. These implements for saving labour are exceedingly handy and are now sold so very cheap as to be within the reach of nearly everybody. Neighbours can cooperate and one get a plough, the next a cultivator, and the next a harrow, and arrange to use them consecutively: that is, when one man has had the plough a week, he passes it on, and starts out with the cultivator for a week to stir up and break the land more thoroughly after the plough has broken the soil up into clods: then he passes on the cultivator, and starts with the harrow to crumble the surface still finer, and smooth it down level. Of course the co-operators must not be of quarrelsome and jealous dispositions, else there will be disagreement. But with suitable people, the plan works well and saves outlay and waste, for few of the smaller cultivators require all three implements like a plough, a cultivator and a harrow constantly. Now when your land is prepared, in wettish districts it is good, though not an absolute necessity, to put the pines in raised beds with small drains between, which also do as foot paths. This is for more complete drainage. It suits well to put pines in beds between young orange trees and thus utilise the land, while the cultivation given to the pines will leave the land in good condition for the roots of the orange trees when they extend in the course of a few years, and fill up the space between; the soil will then be in fine tilth. The beds should be of a breadth to be reached at all parts between by a rake or hoe, from the walks, so 6, 7, or 8 rows will be quite enough.

The next great question is the kind of pines you will plant. There are far more varieties of what we call native pines than are generally known. There are the Ripley, (Red and Green,) Sugar Loaf, Bull-head, Black and Cowboy which are more or less commonly known, though the Bull head and Cowboy are often mixed; but they are not the same. There are other native pines, which are not so well distributed throughout the island, and yet are distinct from any of those I have named. The same pines, however, often receive different names in some parts ofr the island: thus the Cowboy, is the Man o' Wa Pine in Hanover, and the Mammee Pine in St. James and in other districts the "Crab Pine." About Porus there is a Pine called the Chese Pine which bears a fairly good fruit, and in the St. Thomas-ye-Vale district of St. Catherine, there is a Pine of very fine appearance, called the "Sam Clark"; it grows absolutely wild in the bush, and seems to delight to make head-way among the long rank, wet grass, for the district is rather a wet one. There is also a curious piue called—the "Jerusalem," which bears miniature pines—complete little pines, tops and all, round the base. Of the imported pines, there are the Rothschild, the Abbaka, the Enville, the Golden Queen, the Porto Rico, the Smooth Cayenne, the last of which is proving the best grower and most marketable pine of all these. It has smooth leaves, no thorns, and grows to a large size, and is a quick, strong grower, and sure fruiter, the suckers are at present rather expensive, being from 9d. to 1s. each, as they are in great demand both here and in Florida. Imported suckers take a year and a-half to fruit, and then bear at any time of the year, but the suckers from these bear fruit at 10 and 14 months from planting the same as native suckers, depending upon the season when they are planted. The Smooth Cayenne weighs from 6 to 12 lbs.—often more. If any one can afford to plant out such expensive pines, and has favourable laud, I am sure it would be a profitable speculation, as hardly less than 2s. a piece would be the return in the London market and if grown with some judgment and care, and brought in out of the usual season in Jamica, (for our usual season is exactly the worst season for foreign markets,) would fetch not less than 3s. 6d. each, if of good size. The only other imported pine that has been in any way freely planted is the Abbaka; it grows to a good size, hardly so large as the Smooth Cayenne, and is screw shaped, large at the base and tapering up much like the Ripley. The Ripley stands easily at the head of all Pines for flavour; not one of the imported can compare with it in this respect, nor indeed with the Black and Sugar Loaf Pines. Unfortunately for us, pines sell almost entirely by their appearance; if they are big, well shaped, with good tops and with an attractive colour as they ripen, they will sell well. The Ripley is not more than 4 or 5lb. weight at the very best, generally 2 or 3 lb., though I quite believe that good cultivation and selection of the sucker from plants that have made the largest fruits would result in bigger fruits ultimately. Nor is the Ripley, as usually grown, a very nicely shaped fruit, and its top is generally small and often twisted. These defects, I believe, can be remedied. Otherwise the Ripley is an excellent pine, it packs easily, and stands transport very well. Perhaps the next best pine in flavour is the Black Pine: and as it grows to a large size without much cultivation, is a very shapely and nice coloured pine when ripe, and stands transport exceedingly well, it is one of the best to plant; its one weak point is that until it is very nearly full-ripe it does not colour-up, so that markets not used to it think that its dark colour means unripeness. Then there is the Bull-head, which is known by the smooth leaves of its suckers, which have only a few little prickles at the top or here and there on the leaves. I think that the smooth Cayenne may be a highly improved type of the same pine, or the Bull-head and uncultivated or degenerate Smooth Cayenne, at any rate they are like each other. The fruit of the Bull-head Pine under cultivation grows to a very large size, is shapely and stands transport exceeedingly well, but is not, as yet, palatable fruit. The "Sam Clark" has hardly more than been tried as a marketable fruit, and so I will not speak much of it, only to say that it has a very pretty appearance. By this time next year I hope to speak with authority on it. The Cheese pine, too, I have not yet had personal experience of as a shipper. The Sugar Loaf, perhaps the most common pine in Jamaica, one which grows equally well from sea level to the hill tops, and a fruit which grows to a very large size, and which is very agreeable to eat, is unfortunately a very poor shipper. I have noticed in the market reports of the United States this year, enormous—that is the word—receipts of pines from Havana in Cuba, whole steamer loads, as many as 2,000 barrels in one cargo, and that often twice a week these were Sugar Loaf Pines, and the prices were often as

low as 2½ to 3½ cents., that is less than a "quatte" each. Of course, these pines would not be in very good condition, and were roughly packed probably, and the fruit goes soft very easily.

Having fixed on the kinds of pines you will plant, you must see that you get good suckers. A ratoon sucker is the young plant that springs from the root of the old one, other suckers start out from the base of the fruit stem. The little plants starting out from the base of the fruit itself are called "slips," and the tops are the "crowns." A good sucker should not be less than 9 inches in length or more than 18 inches to be at the best for planting. If the suckers are very young and small, the eyes from which the roots are to start will not be sufficiently developed, and so will be ikely to rot out if the soil is wet or in a dry spell to dry up and wither, before the eyes can swell out sufficiently to start roots, which development ought to take place while the sucker is growing with its parent's support. Larger suckers than 18 inches do well enough, but are too top heavy, so that they have to be deeply planted to prevent the wind blowing them over; deep planting is, however, one of the things to be avoided. To get over this difficulty, it is quite correct to chop off the ends of the long leaves, and plant a stump as it were, leaving all the heart of the sucker; the leaves will grow up again and the plant produce a very good fruit; but if the sucker is too advanced, and is thus cut and planted, it will probably send out a young sucker instead of growing itself, which is just as good. The base of the root-stalk of the suckers should always be cut smoothly across before planting, and the lowest leaves around the stem and which cover the eyes, peeled off; this will allow the roots to start out into the soil at once; if these lower leaves are left on, the young roots often cannot pierce through, and simply curl themselves round and round; the plant is then spoken of as root-bound. It does not kill the plant, but retards its progress. The sucker is now ready for planting. Close planting has been found most suitable, for not only is there less ground to prepare and keep clean for a grater number of plants, but the grown plants leaning against each other support the fruits erect, as they have a tendeucy, through being top heavy, to fall over, and either break or get sun-scalded. Not more than three feet wide. between the rows for all Jamica pines, and two feet between the plants are now considered the regulation distances, and I think Bull-heads could be closer, such as two feet by 1½ feet, with advantage, as not havi g thorny leaves, workers can go through them easily. When you plant, you scoop out some of the soil, and put in your suckers, sufficiently only to cover the eyes, and press the earth tightly around it. Keep your ground clean; you will find a common garden rake a handy implement for stirring the surface soil, and there are small hand cultivators, one-wheeled and two-wheeled, with a variety of implements that can be fixed on at pleasure, such as little ploughshares, weed scrapers, cultivator teeth, rakes—which are most expeditious and effective workers. For cutting out weeds in pines when they are grown thick and for loosening the top soil, there is an implement called a Scuffle Hoe which is very well adapted to its purpose.

About manuring,—if you can cover your ground with pen manure of any kind before cultivating, it will stimulate the growth of the plants greatly, and if you are able to find enough wood-ashes, these will be most beneficial to the pines as fertilizers used as a top dressing lightly raked in. If you have not manures of any kind, and you wish to push your pines on faster, you can always buy artificial fertilizers in Kingston, specially made up for the needs of Pineapples. Your plants, if Jamaica suckers, will fruit in from 9 to 12 months from planting if planted from June to Augus—if planted from November to January they will take over 12 months, even to 15 and 18 months; this is because the plant will ever make an effort to come in at its natural season no matter when planted, and will try to delay blossoming until the hot dry months from January to March—with irrigation and some control of the elements it is likely this would not matter. If imported suckers, as I have already said, they will take longer, the Puerto Rico taking likely enough two years from planting. hut although exceedingly large it is not a desirable pine to plant. The natural season for the fruiting of Pineapples in Jamaica is from May to August, and there is also nature's season for planting, as it is then the young plants are produced, but as it happens, late June, July and August, are just the times when our fruit is least wanted in northern countries as the fresh, home-grown fruits, cherries, strawberries, plums, tomatoes, gooseberries, etc., are just coming in then. The best time of the year to get our pines in is from November on to May; before Christmas, pines are in best demand. It is quite possible for large plantations to get them in then, but not for the small man, and this is how. You must plant from September to December; at that time you cannot find medium sized suckers, unless you have been planting out earlier simply to get suckers, for as we have said the natural season is midsummer, so that the suckers have been growing since then; if you break these large suckers of six months' growth towards making a fruit, from the old stem and plant, it may cast them back enough for them to take about a year to fruit, but many will shoot their blossoms and fruit in their usual seasons all the same, and the fruits will be small, so that you may not have any gain at all, although the prices abroad may be better at the end than in the middle of the year. If persisted in, I think it sure that good young plants could be got in from October to December quite regularly, and the fruit brought in at the desired season, a year to 15 months later, and by replanting small suckers every year in August and September, the fruits will mostly come from November to March. Slips take 18 months from planting to produce fruit, but they give fine fruits even better than from suckers. Crowns take 20 months to two years, to produce fruit. It looks as if there would be a good market in Great Britain, and after that the Continent of Europe, for all the pines we can produce, and I deem it very probable that the new Direct Line of fast fruit steamers will enable us to supply the whole of Europe with pines, from Gibraltar to St. Petersburg, the only query left, but an important one, being the net profits to the growers. This remains to be tested. J. B.
—*Journal of the Jamaica Agricultural Society.*

Mango.—It may not be generally known that wheat is not the largest grain crop produced. Maize stands first with 2,778,108,000 bushels to its credit in 1900, against 2,468,799,000 bushels of wheat. Nearly the whole of the maize was grown in the American continent.—*Journal of the Department of Agriculture.*

How to Plant Cuttings.—Many amateurs make great mistakes, in planting cuttings. They leave three-fourths of the lengths of the cutting above ground, and very often push the cutting down by main force into the soil. The most successful way is to make cuttings from 6 to 12 inches long. Make a narrow trench, and put 1 inch of sand at the bottom, and place the cuttings at such a depth that only about two eyes or buds are exposed above ground. Throw a little more sand against the base of the cutting, fill in the soil a little at a time, and tread it very firmly against the base of the cutting. Leave the surface loose,—*Queensland Agricultural Journal.*

TEA SEED OIL, AND OIL CAKE.

MEMO :—The subjoined report by Mr. H. H. Mann, B.SC., F.I.C., upon these products is published for information, by the Indian Tea Association :—

On the 27th June I received from the Secretary of the Indian Tea Association samples of Tea seed Oil and Tea Seed Oil Cake which had been sent, through Mr. H St. J. Jackson, by Mr. H. Drummond Deane of the Stagbrook Estate, South India, with a request that I should make an analysis of them and report to the Committee. This I have now done so far as is necessary for our purpose—and it is perhaps a convenient opportunity to lay before you my views as to the possible value and usefulness of both products, especially as a large amount of speed is now produced, and must be utilised, if utilised at all, in some other way than for sowing.

The value of seed of this character almost entirely depends on the usefulness of the oil and on the possibility of getting good feeding or manurial material from the residual cake. It was attempted in 1885 to put tea seed, as such, on the London market under the name 'taune.' Great interest, I understand, was manifested, but the seeds found no buyer, and the price asked sank quickly to a level far below the cost of importation. At the present day the seed does not come into commerce at all except for the production of new bushes.

The following analysis by Mr D. Hooper ("South of India Observer," 1894) of Tea Seed from the Nilgiris previously dried, shows the composition of the material:—

Fixed Oil	.. ..	22·9 per cent.
Albuminoids	... .	8·5 ,,
Saponin	... ...	9·1 ,,
Carbohydrates	... .	19·9 ,,
Starch	.. .. ..	32.5 ,,
Fibre	.. ..	3·8 ,,
Mineral Matter	... .	3·3 ,,
		100.0

Of these constituents, those of interest for our purpose are the fixed oil, the saponin, the albuminoids i.e., the nitrogen and the mineral matter. Let us take these *seriatim*.

THE FIXED OIL

Is present in small amount compared with that in most other oil seeds, such as linseed, cotton, or castor. I am bound to say, however, that many samples appeared to contain much more oil than the seeds quoted above, but I should consider Mr. Deane's figure of 25 per cent. obtainable by hot pressure as an extreme one for practical working. If high quality oil is wished, the seeds will have to be pressed cold, and not more than 20 per cent. may be anticipated. Even this, I fear, may be taken as higher than would on the average be obtained under commercial conditions.

The oil itself is a clear, light yellow, liquid, non-drying oil, approaching olive oil in character, but which always has a more or less acrid taste, The samples sent by Mr. Deane appears to be free from saponin—a poisonous substance (see below) which nearly always occurs in it, but in order to get this freedom great care has to be taken in pressing. Though when heated the poisonous properties of the saponin are destroyed yet the small quantity which may be present would condemn it as an edible oil for use in western countries. The Chinese, it appears, have long used it for cooking purposes and it might possibly be employed by the people of the tea districts in a similar manner if it were easily obtainable.

As a lamp oil it answers very well, and would seem to be quite capable of local introduction for this purpose. I say local introduction because burning oils are at present rather at a discount in the markets of the world compared with their former position—kerosine and petroleum products having largely taken the market in the great centres which was formerly theirs. At the same time the fact that it is satisfactory for this purpose should not be forgotten.

The oil produces an excellent soap hard and white. For this purpose the presence of saponin would be no disadvantage but would rather add to the lathering power of the soap. If the oil could be produced in quantity and a supply guaranteed at a rate which would compete with the other vegetable oils, there is no doubt an opening for it in this direction.

THE SAPONIN,

This poisonous constituents of the Tea Seed is all but entirely contained in the cake, after expression of the oil. It is a white solid sweetish to the taste at first but rapidly becoming bitter and acrid in the mouth and it leaves a biting sensation in the throat for some time. It is exceedingly poisonous and its presence at once destroys any chance of using the cake or the seeds as a feeding stuff for animals.

THE ALBUMINOIDS AND NITROGEN.

To the nitrogen contained in the albuminoids the cake would owe the greatest part of its manurial value. In this respect, however, it does not for one moment compare with most other oil cakes. Compare, for instance, the following figures respresenting the average amount of nitrogen in other manure cakes compared with that given by Tea Seed Oil Cake :—

		Nitrogen per cent.
Mustard Cake	... ..	4 to 5
Linseed Cake	... ...	4 to 5·5
Castor Cake	... ...	5·5 to 6·5
Decorticated Cotton Cake	..	6·5 to 8
Undecorticated Cotton Cake	...	3·5 to 4·5
Tea Seed Cake	... ..	1·92

Thus, if castor cake were worth 2 rupees per maund in Calcutta, calculating on the basis of the nitrogen alone, the tea seed cake would only be worth about 12 annas per maund.

THE MINERAL MATTER.

In other points the Tea Seed Cake is likewise inferior for manurial purposes. Comparing again the following figures for mineral matter and phosphoric acid in several manure Cakes, this will be clearly seen :—

	Mineral Matter per cent.		Phosphoric Acid per cent.
Mustard Cake	... 8 to 10	.. ..	2 to 3
Linseed Cake	.. 4 to 6	.. ...	1·5 to 3
Castor Cake	... 9 to 10	... ...	2 to 3
Cotton Cake	.. 7 to 8	... ..	3 to 4
Tea Seed Cake	... 3.3 to 4.07	.. ..	0·58

Taking these various points into consideration, it will at once be seen that as a manure the cake produced by pressing tea seed is of very inferior character, and would harly pay for carriage over very long distances for this purpose,—nor can it compete in any market with cakes produced from other oil seeds. On the other hand it is quite good enough to use locally, provided the net cost does not exceed 8 to 12 annas per maund on the garden.

It (the cake) is however supposed to have insecticidal properties; and might be useful for this purpose. In the paper above quoted, Mr. Hooper suggests spraying the bushes with a decoction of the seeds, or dusting the plants with a powder made by grinding them up. Such a decoction is likely to be serviceable against red spider, but exactly of what value it is can only be determined by trial. Spread on the ground round the bushes

the cake would be likely to keep away some types of carterpillar, and other pests which spread by creeping from bush to bush, or which make their home in the ground during the day. A strip covered with the cake between the tea and the jungle would probably keep out many of the pests which creep the surrounding land into the tea.

The utility of the cake itself as an efficient substitute for soap is very doubtful. Though it lathers well, on account of its saponin content, yet this does not necessarily mean that it has great cleansing properties. Nevertheless it has been used for many years in China instead of soap, and it would probably be of *some* value for this purpose. One more use is made of the cake in China. It is there stated to be very effective as a poison for fish.

On the whole, therefore, while I think there would be a market for the oil if it could be obtained in quantity and fairly cheaply it must, for the present, be a local one, and the material could hardly compete with oils already in general commerce, unless it be for the production of superior soaps. As a lamp oil it has distinct advantages which should recommend it for local consumption. The press cake is useless for feeding, and forms an inferior manure, though one quite good enough to apply to the land and also to cart for some distance, provided the cost on the garden does not exceed 8 to 12 annas per maund. It would probably be useful as an insecticide—both as cake against certain caterpillars, and as decoction which might replace that of a wild fern now used in Dibrugarh against Red Spider.

The analysis of tha cake supplied by Mr. Deane was as follows :—

Moisture	11·99
Oil	10·48
*Albuminoids	12·00
Carbohydrates, &c.	58·80
Woody Fibre	2·66
†Phosphoric Acid	·58
Lime	.11
Alkaline Salts, &c.	2·78
Sand	·60
	100·00
*Containing nitrogen	1·92
†Phosphate of Lime	1 26

HAROLD H. MANN.

Calcutta, *August 12th, 1901.*

CULTIVATION OF SWEET POTATOES.

BY PERCY G. WICKEN.

The Sweet Potato (*Batatus edulis*) is a native of tropical South America. It was first introduced into Europe from Brazil, and has since proved to be well adapted for cultivation in the Australian States. It is a robust and hardy growing plant, and, given suitable soil and locality, is a prolific bearer; it is valuable both as food for man and cattle and should take a much higher position in our rotation of crops than it has done in the past.

SOIL AND LOCATION

A soil free from stones seems essential, and a sandy loam is the best for this crop. A stiff clayey soil causes the tubers to split when the weather becomes dry and hot.

The ground requires to be well drained, and in a district that will be free from frost during the growing months, viz : October to April. In many localities the cuttings cannot be planted out until November, owing to the weather not being sufficiently warm to start the cuttings in time to plant out earlier.

SEED BED.

Many settlers fail in growing this crop from want of knowledge as to how to produce the cuttings to plant out. The following is the method I have found most successful. Mark out a piece of land, in a sandy soil if possible, sufficiently large to allow the potatoes to be spread over. An area of 6 ft. by 6 ft. will be sufficient for 2 cwt. of potatoes. Then remove the top four inches of soil from the space and place on each side of the bed, now take your potatoes and lay on the bottom of the bed, taking care that they do not touch each other, and throwing out any that have started to go bad then put back the soil previously removed on the top of the potatoes, levelling the bed and lightly packing down with the back of the spade. If the ground is very dry give a good watering. In a few weeks' time, according to the weather, the young shoots will appear above ground, when about three inches high they are ready for planting out. Start in one corner of the bed and remove the soil and lift out the potato, and it will be found to be covered with young shoots, some potatoes having a few dozen, others up to a hundred shoots, according to the size of the potato. These shoots are now broken off from the tuber and are ready for planting out. The tubers can be replaced in the ground the same as before, and in a very short time a fresh crop of shoots will appear which can be removed in the same way, and if not too late in the season, a third crop may also be obtained.

In localities where the season is late the following method may be adopted. Make a frame of same old boards, sink about 1 ft. in the ground and about 1 ft. above it. Throw out the first foot of soil and then place in the space about 18 inches of good stable manure and tread well down and cover with about 4 inches of soil, leave for a couple of days, and then lay the potatoes on top of the soil the same as in the other seed bed and cover with 3 or 4 inches of fine soil. The shoots will come very quickly. If there is still any danger of frost, the beds must be covered at night with a light brush or calico screen, and the cuttings must not be planted in the field until all danger of frost is over. If the shoots appear in the bed in an irregular manner, it is better to pull them out by hand when required, than to disturb the whole tuber, which will be covered with small sprouts. The shoots will come away easily, and if pulled carefully very few will be broken. The shoots should be kept in a box or wrapped up in a wet sack while being taken from the seed-bed to the field, and should not be left lying about exposed to the sun.

MANURE

The Sweet Potato feeds largely on Nitrogen and Potash with a smaller amount of Phosphoric Acid, and a manure containing these ingredients should be used. A mixture composed as follows;—

3 cwt. Nitrate of Soda
4 cwt. Kainit
3 cwt. Superphosphate

per half ton would probably give good results. It should be applied in the ridges at the rate of 3 or 4 cwt. per acre at the time of ridging up the ground preparatory to transplanting the cuttings.

PREPARATION OF LAND.

The land requires to be well and deeply worked, and the crop responds well to deep cultivation ; being a summer crop it requires to obtain its moisture during the dry weather and for this purpose sends its roots deep down into the soil. For this reason subsoiling is of great advantage to the plant as it is to most other plants. After the soil is well broken up it requires to be brought to a fine tilth by discing, harrowing, etc. As soon as the plants are nearly ready for transplanting the land should be drilled out into ridges, 3 feet 6 inches apart, by a drill plough, or a corn hilling disc is very useful for this purpose. The system I carried out for planting was as follows :—A small hill was made by running the cornhilling disc along the rows with

the discs set at a slight angle, the manure was then spread along this drill by hand, the machine again run over the hill with the discs set at a greater angle which hilled it up to a good height and covered the manure, and the land is then ready for planting the cuttings or slips.

PLANTING.

The slips should be planted in rows about 18 inches apart, and with the rows 3 feet 6 inches apart it will take 8.556 to the acre. If the rows are 4 feet apart 6,136 to the acre. The best method for planting is for one man to go along the row with a marker and mark out where the slip is to go and to make a hole in the ground, the planter following and putting the slip in the hole previously made, care being taken to press the earth well round the slip. If planted on a dull day and the ground is fairly moist the percentage of misses will be very small. Any slips that fail to take root can be replaced later on. Later in the season if it is desirable to put out a larger area, or a large number of misses reqnire to be replaced, slips can be cut from any of the growing vines and planted out in exactly the same manner as those taken from the seed bed as previously described. From observations made by the writer it does not appear to have any effect on the crop whether the slips are taken from large or small tubers, so long as they are healthy and vigorous. It would therefore be more profitable to use the smaller size potatoes for this purpose, which are not so ready of sale as the larger ones.

CULTIVATION.

When the young plants are once established very little more requires to be done, except to run the Planet Junr. cultivator between the rows at frequent intervals so as to keep the ground free from weeds and well stirred. If there are many weeds come up, it will be advisable to give the hills a good hoeing to prevent the weeds from growing and depriving the potatoes of their food and moisture. In running the cultivator between the hills care must be taken not to set the implement too wide so as to tear down the side of the hills and expose the young roots to the sun.

HARVESTING.

This operation must be performed by hand, as the tubers grow to a large size, and if dug by a plough large numbers are cut to pieces, and otherwise damaged. They should be dug during dry weather and as soon as the tubers have reached maturity and before they have time to make a second growth. The maturity of the sweet potato may be ascertained by breaking it. If the sap oozes freely it is of course immature, if little sap exudes it is nearly mature. Experience will soon be gained in this matter. As a rule the tubers are ready to dig about the end of March or the beginning of April. Care must be taken in digging and handling not to bruise the potatoes, as a small bruise when freshly dug is likely to cause the potato to rot. It is also beneficial to leave the potato in the sun for a short time after being dug before bagging or putting into a shed, and when bagging all damaged, cut or bruised potatoes must be excluded. These damaged potatoes will only keep for a short time, and can be used on the firm for feeding pigs or other stock

PRESERVATION.

One of the most difficult points about Sweet Potato growing is difficulty of keeping them so as to market at times of the year when they will fetch a good price, and also during the winter months so as to have a supply for the seed beds in the spring. The best way on a large scale is the method of "hilling or banking." This should be carried out under a shed or open roof so that the bank is not exposed to the weather. The best method to proceed is—lay on he ground, which must be dry, a good layer of straw; on top of this pack the potatoes in the form of a mound and cover the whole heap with a quantity of straw, and then put sufficient earth on top to cover the whole. In many instances where large stacks are built a zinc pipe perforated with 1 inch holes is placed through the centre of the stack, which allows all surplus moisture to escape while the potatoes are going through the sweating process. Another method which is only applicable on a smaller scale, but which I have always found very successful, is to obtain a number of old empty cement barrels, which can generally be picked up very cheap, place in the bottom of the barrel a layer of dry sand about 3 inches deep, then a layer of potatoes, then another layer of sand and so on until full, placing about 4 inches of sand on top of the barrel; this will keep the tubers quite sound all through the winter, and only one barrel need be opened at a time as required for use.

VARIETIES

There are a large number of varieties of swee potatoes. At the Georgia Experimental Station, U.S.A., thirty-four varieties were grown last season and reported on, the heaviest yield being the White St. Domingo. In the Australian States, however, only two varieties are at the present time obtainable, and they are generally known as the White Sweet Potato and the Red Sweet Potato. Both are good varieties and grow and yield well; the white will grow in ooole districts than the red.

DISEASES.

The Sweet Potato is attacked by several fungus diseases. The most important of these is the Black Rot Fungus *Ceratocystis Fimbriata*. The accompanying illustrations show a tuber attacked by this disease. It attacks the plant at any time of its existence even after being stored. The black spot is at first very small, gradually increasing in size unti the whole tuber is destroyed. Owing to the nature of this disease, it is important that every precaution should be used to prevent it obtaining a footing. For this reason no diseased tubers should be used in obtaining shoots, young plants should be selected with great caution and discased or suspicious tubers destroyed. Should any signs of the disease appear the plant should be immediately sprayed with Bordeaux mixture, which will prevent the development of the spores. All diseased plants should be burned, so that the spores of the disease do not remain in the soil. Do not plant in the same ground as a previous crop has been in, but carry out a system of rotation of crops and thereby prevent the spread of disease.—*Journal of the Department of Agriculture of Western Australia.*

PLANTING AND NEW PRODUCTS IN ZANZIBAR.

COFFEE—TEA—CACAO—RUBBER AS WELL AS COCONUTS AND CLOVES.

Only in April 1901 does the report dated February 24th, 1900, of Mr. R. N. Lyne, Director of Agriculture, reaches us:—

He says:—Mr. W. J. Robertson (who must be an cold Ceylon planter) has briefly explained the progress that has been made at Dunga with Coffee, Tea and Cocoa. You will observe that in each case the condition of the young plantation is satisfactory and the prospects encouraging. Mr. H. Listber's report on the Tundaua plantation is included. This has been a very bad year for cloves, coconuts and fruit, and the natives at one time suffered much from the failure of their first crops. Growth has, however, revived under the timely rains of December and January.

(From Mr. W. J. Robertson's Report on New Products.)

Coffee.—A Liberian coffee clearing of 4½ acres was planted early in April. The distance of the rows were 9 ft. apart and the plants in the rows 9 ft. from one another. These distance, 9ft. x 9ft., when planted, give 537 plants to an acre. Holes 18″ × 18″ were cut for each plant, and left open for some days and filled in with top soil. The plants were only about 6 inches in height and were most carefully planted, each one being shaded with bracken fern at the same time. The plants in the clearing are now nearly all 3 ft. heigh, a most vigorous growth for 8 months, and the clearing has a good even cover. This I also attribute to the judicious shading. The only vacancies in the clearing have been caused by snails *(kono-kono)* eating the young plants, and reattacking them after shooting out new yonng leaves, until they eventually die. We put on women every morning going over the clearing collecting the snails which had a slight effect in reducing the number. They do their work of destruction at night and early in the morning wend their way back to cover such as bananas, aloes, etc., and this is the time to catch them. We have since found the best remedy is to put a little lime or ashes round each plant. Snails will not go over this. They do not attack tea or cocoa but seem to have a particular liking for coffee, fruit, kola and shade tree plants, which latter we have to protect by fencing with sticks put close together round each tree. They will always be a source of destruction to young plants and a means must be found of exterminating them. The growth of the Liberian coffee plants equals anything I have seen in Ceylon, where it is chiefly grown in the low country, and the clearing is quite a little pitcure. A nursery of young L. coffee plants is coming on well at Mpapa and the few vacancies there are will be filled up when the planting season comes.

I would not recommend the further planting of Liberian coffee as I am of opinion that Arabian would grow well at Dunga, and it is a far more satisfactory variety to grow and deal with in every way. Liberian has a rough coarse berry and is hard to pulp and fetches a low price compared with Arabian. I think that Dunga is adapted in every way for a Coffee estate, the lay of the land is good, the soil a dark sandy loam with sandy clay bottom, and the rainfall considerable. Dr. Voelker's report showed the soil at Dunga fairly rich in phosphoric acid which, with lime, is the most important mineral constituent in a coffee soil. A few (about 20) Arabian coffee plants were planted at Dunga about 3 years ago and lived and grew all through the drought of 1898. I topped these a few months ago and they are now forming into good bushes, equal to any of the same age that I have seen in Ceylon. About 3¾ acres of land has been cleared, lined 6 ft. × 6 ft., holed and filled in. The holes were cut 18″ deep, 18″ wide at the top and at the bottom. This clearing will be planted with Arabian coffee when the season comes round. The seed was procured from Nyassaland and as the plants are coming on well at Mpapa nursery they will be fully 1 ft. high when planted out. We have also ordered ½ bushel of seed from Nyassaland, which will give enough plants for supplies in 1901 and to open up a further 25 acres. There are also a few plants of *Coffea stenophylla* in the Mpapa Nursery, the seed of which was sent us from Sierra Leone. These will also be planted out in the rainy season.

Tea.—An experimental clearing of about 4½ acres was planted in April at the N. end of Dunga near the labour houses at the end of the avenue. The plants were set 5 ft. by 5 ft., giving 1,742 plants to an acre. Holes 18″ deep × 12″ wide were cut and, like the coffee, left open for some days to take all sourness out of the soil and, previous to planting, were filled in with good top loam. The holes in this way contain good free soil and the young roots of the plants can find their way down without any obstruction. The seed of the plants, an Assam Hybrid, the most suitable variety for low elevation was obtained from Horagalla Estate, Ceylon. It was packed in charcoal and, considering the long voyage it had to undergo, reached here in first rate condition, quite 50 % of the seed giving plants, often a very good percentage for seed sown in local nurseries in Ceylon. The seed arrived here rather late in December 1898 and the plants were only about 4 months old from seed when put out in the clearing. Plants should be at least 6 months in the nursery before being moved, but as the monsoon was on and showed every sign of being a good one we decided to plant up the 4½ acres rather than lose a year. There are some vacancies, the smallest plants having died out, but on the whole the clearing is a success and has a fair cover, most of the plants being now over 2 ft. high and looking vigorous. The growth of these plants has been as good as I have seen in the low country of Ceylon, for the 8 months they have been planted out. The plants were all shaded lightly with bracken fern when planted and to this I attribute the success of the clearing. In a country like Zanzibar where the weather is so uncertain and the sun so fierce all plants should, in my opinion, be lightly shaded immediately after planting, even in wet and cloudy weather, and after they show signs of having set the shading can be cautiously and by degrees taken off and so harden the plants. A half maund (40 ib.) of the same seed arrived from Ceylon in September 1899. This was put out at the Mpapa nursery, and has come up well. The vacancies in the clearing will be planted with these plants in April next when they will be nearly 7 months old and should thrive well. It is most important to always have a nursery of young plants coming on to supply what vacancies have occurred dnring the year, whatever size the clearing may be, as in this way alone can an even cover be obtained. After the tea is three years old supplies do not thrive, so during the 3 years special attention should be given to supplying each planting season. This holds good for all clearings of coffee, cocoa, etc. After supplying the vacancies in the old clearing there will be sufficient plants to extend the area 2 or 3 acres. Two acres have already been lined and holed ready for the planting season and as all the plants will be 7 months old from seed, with a favourable season this clearing should do well. The first planted tea will be ready for its first topping about July 1900 when it will be 15 months old. The plants will be cut down on red wood to 18″ leaving the young laterals around untouched, which will soon reach the level to which the plant has been topped and increase the surface of the forming bush. From this topping a little leaf can be collected and a few lb. of tea made. The bushes will them be left alone till about the end of the second year, viz., about January 1901, when they will get their 2nd topping. Should the growth be very vigorous a little leaf could be plucked a month or so before this topping. The bushes will then be cut down to 22 inches on red wood, or 4 inches above the 1st topping, leaving all lateral branches as in the first topping and when they reach the level the bushes will have a good surface. When the shoots from the 2nd topping have reached over 6 inches (or 28 inches in all) they will we plucked off to this height and this will be the plucking surface of the bushes for the year, and anything below this must be left until it reaches above the surface. After this the bushes will be gone round regularly every 9 days and what leaf is ready over the plucking surface, plucked off. The bushes should be in full bearing by the end of 1901; but great care must be taken to see they are not over plucked by the labour when going round them. Judging from the growth of the plants that are coming on now and from the forcing nature of the climate as well as by the continuous heavy dews all the year round I

am of opinion that tea will grow and flush well in Zanzibar, wherever there is a fair depth of soil. There is a great similarity of climate between Zanzibar and low country Ceylon, where tea gives a yield of from 600 to 800 lb. an acre. There is also a good proportion of iron in the soil about here, a most important mineral constituent of tea. Tea can never be a large industry in Zanzibar as there is not sufficient suitable land, but there is enough to grow what is required for local consumption and this I believe would pay handsomely. But in any case our experimental clearing will be able to test this in a year or so. A maund (80 lb.) of seed is on order from Horagalla Estate, Ceylon, and this should give enough plants, when put out in the nursery, to supply vacancies in season 1901, and extend the area 6 acres. This will give a total area of nearly 13 acres and be sufficient to thoroughly determine if tea will grow and pay to grow here. A careful account of all expenditure under tea will be kept.

Cocoa.—An acre of Cocoa was planted in November, 1898, but as the N. E., monsoon was a failure, hot dry weather set in, and we lost about 40 o/o of the plants. These were supplied in April last and the clearing has now a good cover. Another 7 acres of land was opened and planted up last April. The distances of the plants were 14 ft. x 14 ft., which give 222 to the acre. Holes 18 in. x 18 in. were dug for these. The plants were brought up from seed in bamboo pots and were all fine sturdy plants over a foot high when planted out. The pot being planted out in the hole the roots were in no way disturbed, a most essential point with cocoa, as the slightest damage to the root would cause the death of a plant. The clearing has a good cover and the plants are looking most promising. Cocoa is a most disheartening product to grow. It is the most delicate of all the common economics and has to be carefully dealt with from seed to planting. Nearly every insect attacks it and the plants are from time to time bared of their leaves and hang, many of them dying out in consequence. They must be kept supplied yearly. After a plant is 3 years old it may be called set. Cocoa does well down to sea level in Ceylon and should do well here. It is a struggling plant and will eventually make a soil for itself. It is very hard to get good fresh seed into Zanzibar as it does not keep any time and would arrive here in a perished condition if subjected to a long sea voyage. The last lot from Seychelles did well and we are getting 100 pods more from here. This will give enough plants to supply the old clearing and extend the area another 5 acres n season 1901.

Cocoa is a product that must have permanent shade to thrive well, while young bananas and mohogo act as good temporary shade. These we have planted in our clearing and in April will plant more permanent shade trees. For this purpose we have some plants of *Pithecolobium saman* coming on well at Mpapa nursery. This tree is a rapid grower as well as a deep feeder and the particular property which it possesses, and which makes it so valuable as a shade tree, is that of closing its leaves at night and thereby not interfering in any degree with the deposition of dew, whilst in the day time the foliage is not so thick as to exclude too much light. The jak tree, though it does not grow very rapidly, is also a deep feeder and its timber is valuable. We have plants of this tree coming on which will be planted out in the S. W. monsoon and we also intend to try castilloa elastica for shade. The bois immortelle has been already planted in the 7-acre clearing and the trees are nearly 3 years old. It is the chief and favourite shade tree in Ceylon and Trinidad on account of its rapid growth but does not seem to thrive well in Zanzibar, many of them dying out after they are 2 years old and the growth is very backwards. While on the subject of shade trees I may mention that I am of opinion that in a hot country like Zanzibar where the sun is so fierce and droughts are apt to occur, shade trees should be planted through all clearings at the time the product plants are planted, as in this way they will not impede the root growth of the young plants. Good deep feeding timber trees should be selected as in the event of the clearing proving a failure, value can be got out of them afterwards.

W. J. Robertson.

Rubber.—We have not been fortunate with our rubber plantations, principally because we were tempted to put out most of our young Para and castilloa trees in November 1898 in anticipation of the small rains, which, however, failed. During the subsequent hot weather many of the trees died. Those that survived are doing well, especially the castilloa, the few remaining trees of which look extremely healthy. Two of the Para rubber trees that were planted at Dunga in 1897 have shot up to over 15 ft., but others, contemporary with these two, seem to hang. The Para rubber trees that were planted at Pemba in one of the rice flats of Tundaua, and which I spoke of last year as having surpassed our Dunga trees, have received a check which I attribute to stagnant water at the roots remaining over from the rains, It was after the rains that they began to fail. These trees may recover though some of them have been killed, but in any case it is instructive to note that the young Para trees which were planted in a fairly typical Pemba rice flat—a low moist forcing valley, swampy as all Pemba valleys are—in the wet season, have not up to now been a success. We have not proceeded with the planting of Ceara on the coral. The trees do not thrive there and their stunted growth makes them an easy prey to parasitic attacks. There is not a good vigorous tree from the one thousand we put out two years ago. By contrast there are a few Ceara trees in the deep soil round the house which have grown to fifteen feet in the same number of months and are now bearing seed. The soil of the coral is too shallow for the proper support of this plant. We may sum up our experience in rubber planting as being on the whole so far unfavourable both in Zanzibar and Pemba. We still intend, however, to continue the experiments as individual trees of all the species represented grow well, These are *Hevea braziliensis*, *Castilloa elastica*, *Manihot glaziovii* and *Ficus elastica.* We purpose, however, to confine our attention principally to improving the natural forests of Pemba, work in which is now proceeding.

Vanilla.—We have increased the cultivation of vanilla to 3,000 vines. All the new plantations were set out in small patches of natural forest dotted about the estate. Lines of mbono were laid out inside as live supports and the vanilla trained along these. The first plantation in 1897 was planted with mbono as the only shade, and we have had much trouble in keeping the vanilla protected from the sun's rays during the cold season when the mbono sheds its leaves, as well as during the hot months. Planting in forest shade relieves all anxiety upon this point, though it remains to be seen whether the vines bear so well, as the cover may prove too thick. The plantations look well. This year we may expect the old plantation to flower and fruit,

China Grass (Bœhmeria nivea).—Two cuttings have been made from the small plot of China grass, the first on April 7th. Seven roots yielded 70 stalks, ½ inch thick and 5 to 6 feet long, the total gross weight, including leaves, being 25½ lbs. The ribands had a good length but were not considered good enough to send home. The canes had 2 feet of young growth at the top, the ribands from which had not matured and easily broke. The canes have always this young growth at the top which materially diminishes the fibre-bearing length. The plants have been allowed to grow without watering in order that their growth might be observed

under conditions corresponding to those they wonld enconnter in a plantation here. Another small patch has been planted with stolons from the original plants and is growing well.

Machui Plantation:—Clove picking began in July. Our yield of cloves this ssaon has been under 100 fraslas as compared with 1,537 last season, so we have practically nothing to report about the crop except to say that it has been a failure. The trees however look well and I hope next year we shall see some return from the extra weeding we have given this plantation since we took it over. The yield of coconuts has also fallen off. We gathered 93,489 nuts from about 3,106 trees, an average of abont 30 nuts per tree. 75,000 of these were gathered during the first 7 months of the year. Trees always yield poorly after July, but the contrast this year has been striking; moreover the nnts have been small. The net profit shown on this shamba for 1898 was Rs. 3,711: and for 1899 Rs. 2,384. The profit on the season, August 1898—July 1899, was Rs. 5,917. This is after paying all expenses—weeding contracts, overseer's wages, the planting of 5,000 coconnt trees and 12,000 seed nnts, from which we have 9,000 young plants ready to put out in April. The monthly expenditure averaged about Rs. 200 inclnding overseer's wages. We intend this year to replant all the vacant places, amounting to several thousands, both in the Machni and Dunga clove plantations.

Dunga Plantation.—Clove picking began at Dnnga on July 24th. The yield up to the end of December has been about 190 fraslas with very little more indeed to come in. The 1898-99 crop amounted to 381 fraslas. The shipment of 35 bales (140 fraslas) of cloves we sent home last year to Messers. Gray, Dawes & Co., sold very well. The following correspondence was received from Messrs. Gray, Dawes & Co., on the subject of these cloves:—"March 22nd, 1899. We have received your small shipment of thirty five bales cloves and are pleased to be able to report most favourably on the condition and quality. We class them as very fine picked Zanzibar cloves, bright heads and stems. Up to the present we have succeeded in selling twenty five bales at 5½d. per lb. and we hope soon to be able to sell the remaining ten bales at the same price. This rate is fully 2d. above the market qnotation, and we think we are right in saying that a difference to this extent between fair and fine cloves has never been realized before."

"June 5th, 1899. As already explained there is only a very limited demand for fine cloves at such a high price, and should a shipment of say 500 bales come forward they would only realize abont ½d. per lb. over the market price for fair cloves. For shipments of say twenty to thirty bales at a time we think the high price conld be kept up provided sales were not forced." The remaining 10 bales were sold at 5d. As explained in my report for 1898 very simple measures were adopted in the preparation of these cloves. They included picking, as far as possible, only ripe cloves (when picking is kept well in hand the difficnlty is to prevent the people gathering geen cloves to make up their measnre, geen cloves shrivel); separating the burst from the sound buds in the stalking; spreading out in the godown at night and never allowing any fermentation to set up; tnrning over the dried heap every day; passing the dried cloves through a screen to separate out the light heads and dirt. A portion of the cloves were dried in the glass honse, but I think this had not much to do with the improvement in qnality, though perhaps a little. The net proceeds of this small consignment, after paying all expenses of freight, commission, etc., was Rs. 1,332 equal to Rs, 9½ per frasla. Messrs. Gray, Dawes & Co. state that this high price could not probably be obtained for more than 20 or 30 bales, but they also say that for large qnantities of, say, 500 bales, ½d. per lb. over the market price for "fair" might be expected, which is equal to over a rnpee a frasla, well worth the small extra expense and trouble incurred. His Highnes the Sultan directed me to construct some clove drying stages at Machni. They consisted of a number of square wooden frames 5ft. by 5ft., into each of which 4 sliding trays closed, one on the top of the other. The square frame or box was supported on 4 short posts and roofed over with makuti. The cloves are spread ont on the shelves and remain there till dry. At night or in a shower of rain the four shelves can be at once closed, thns saving a great amonnt of labour, besides allowing the cloves free circulation of air. The trays are of the size of the ordinary drying mats and can be made either of canvas or of perforated zinc. They can be constructed by the plantation carpenter at little expense, We had not sufficient cloves at Machui to judge of their efficacy, but we erected two of the stages at Dunga for the sake of experiment and sent a sample of the cloves home to Messrs. Gray, Dawes & Co. who reported on them as follows:—"In the present state of the market [Dec. 1899] they would we think realize 5½d. per lb. in small quantities. The cloves are nice and clean and heads particularly bright. A comparison of these with the shipment of 35 bales shows them to be of mnch finer appearance, although this is no doubt partly cansed by the previons lot having gone off considerably throngh keeping." We continue to plough between the rows, to dig round the trees and to scatter a little manure, already with marked effect npon the appearance of the plantation, and we are now topping all except the largest trees. The tops of the trees can never be properly picked and are therefore better cnt away. This, besides, developes lateral growth in the tree, keeping the buds within access of the pickers. Topping should also induce a more vigorous growth of leaf and bud. I believe that in the old days when labonr was plentiful Arabs systematically topped their clove trees.

The coconnt trees at Dunga have not yielded well, the average being 31 nuts per tree. The decline occurred during the latter half of the year. The number of trees bearing ripe nuts also showed a falling off as the year advanced, only 50 per cent. of the trees being climbed during the Angnst gathering. The price has varied between Rs. 18 and Rs. 25. A new plantation of 1,579 trees was laid out in April and May, the yonng palms being placed 35 feet apart. The gaps in the old plantations were also supplied. The receipts from the sale of frnit and from the rent of cultivating tenants amonnted to Rs. 187-14-0 which just covers the cost of collection. This has been an extremely bad year for frnit of all kinds, with the exception of pineapples.

CLOVE RETURNS.

	Fraslas.
1895	537,845
1896	361,869
1897	332,521
1898	368,851
1899	483,881

SEASON SEPTEMBER TO AUGUST.

	Fraslas.
1895-6	579,955
1896-7	312,130
1897-8	188,957
1898-9	642,195

During the 5 years, 1895-9, Pemba has yielded 73 per cent., and Zanzibar 27 per cent., of the total crop. —*Zanzibar Annual Report.*

ZEBU CATTLE IN TRINIDAD.

BY C. W. MEADEN.
Manager of the Government Farm, Trinidad.
AND J. H. HART, F.L.S.,
Superintendent, Royal Botanic Gardens, Trinidad.

The introduction of Zebu cattle into Trinidad dates from the year 1879, when three bulls and three cows were imported. Others were introduced about the same time or a little latter, by enterprising planters, and the resulting influence on the herds on their estates was markedly apparent. The notes in this paper, however, refer in the main to the work of the Government Farm. The bulls originally introduced were obtained from the East Indian Government Hissar, an establishment maintained by that Government for the production of gun bullocks. This institution does not part with female stock and Trinidad is under an obligation to General Angel of Hissar, farm for the purchase of its cows, which were described as pure bred Hurinahs. From this beginning the Trinidad herd has been formed. It has been kept pure, and, by the introduction of a new bull every fourth year, deterioration has been prevented. Photographs and measurements have been exchanged with the Indian Department which show that Trinidad is not only on equal terms with, but, in some instances, even in advance of them.

The Zebu or Brahmin is of great antiquity, and the continuity of special characters and form is specially remarkable, naturalists classing it as a distinct species under the name of *Bos indicus*, a name which indicates its native country. The points of a true Zebu are not difficult to describe, but their crosses are scarcely distinguishable from a pure bred animal and it is only when an authentic herd-book is available that any positive pronouncement can be made; a state of affairs which obtains in almost any breed of cattle. The distinguishing points of this magnificent breed may be described as follows;—Prominent hump on the forequarter of the male and female—smaller in the latter; long pendulous ears, silky to the touch; heavy dewlap extending to the lower jaw; short crescent horns; drooping hind quarters; fineness of skin; slender limbs; and tail terminating with a fine trace of black hairs. The appearance of the animal should be calm and dignified, the eye full and prominent, with a look of latent power than can at at times be well displayed. A pure bred bull on his own domain is one of the most stately animals in existence. The Zebu ox is a splendid draft animal well adapted for tropical agricultural work, extremely active, and possessed of great powers of endurance. His fine limbs, sound hard feet and good action are all in his favour as a working animal. With a minimum amount of feeding and care he is capable of doing more heavy and exhausting work than any other beast of burden in the tropics. Well bred oxen are however somewhat difficult to break in, but once broken, they are very docile and obedient, as can be seen by the way in which little coolie boys are able to control them. The Negro is, as a rule, unable to exercise the same control over this class of cattle as the East Indian driver. Good working oxen are always saleable and the prices realized at the Government sales have invariably been satisfactory, although of late years they have decreased somewhat owing to the uncertain state of the sugar industry.

As milkers, the pure breed fails in some respects. Most of them resist the restraint which necessarily accompanies the act of milking and in consequence their yield is deficient. Their milk is somewhat weaker than that of ordinary milch cows under the same treatment, the analysis showing as follows:—

	Specific gravity.	Solids (not fat).	Fat.	Ash.	Cream
Zebu Cow	1031·0	8·9	3·72	·72	4·5
Ordinary Cow	1027·7	9·09	4·55	·75	7·0

The above analysis was made with the afternoon milkings. It would not be fair to the Zebu, however, to condemn them entirely on the trial of their milking qualities in Trinidad. It is certain that for long years in India the milking qualities have not been at first consideration, other points have been considered as of more importance in selection. It is clearly possible that, by proper selection, a strain of Zebu milkers might be obtained little, if at all, inferior to any other class of cattle. This view is strengthened by the fact that individual cows have been found among the herd which have proved themselves excellent milkers. The practice in Trinidad is to allow the calves to run with the dams as soon as they are strong enough, with the object of bringing them forward as fast as possible, and giving them every advantage at the annual sales.

Crossing milch cows with a pure bred bull has often resulted in the production of first class milkers, but the milking qualities appear to suffer if bred too close. A first or second cross produces animals eminently suited to the tropics, inured alike to heat or moisture, invariably thrifty, and giving milk which compares favourably both in quantity and quality with that of any country. What knowledge we have of the crossing of this breed for the production of beef is distinctly favourable, the quality is good, and from the butcher's point of view, they scale well, The waste in offal in animals killed in the tropics is generally greater than in temperate climates, on account of certain local conditions.

Our bullocks from the time they are weaned until reaching four years old are entirely grass fed, except for a short preparation previous to selling, At this age they scale some 1,000 to 1,200 pounds, and are generally sleek and in prime condition for the butcher. Having been fed in clean pastures the meat is tender and entirely free from the large amount of "muscle" which renders the flesh of the imported Venezuelan cattle so tough and tasteless.

Well bred Zebu cattle cannot be termed tractable in the same way as the Hereford, the Polled or the Jersey, but on their own ground they are not difficult to deal with. Trouble arises, however, on their transference from one place to another, or on any alteration in the handling to which they have become accustomed. In such cases they show extreme excitement and are prepared to go over, or through, anything. Another disagreeable feature is their lying down and offering passive resistance when overcome. The best treatment in such a case is, not to beat them or to permit the too common practice of tail twisting, but to fill their nostrils and ears with cold water by throwing it smartly in their faces. Nothing brings them to their feet quicker than this simple and harmless treatment. The plan of dealing with cattle in the Trinidad herd is not to drive them but to call them, rattling the feeding bucket at the same time. Zebus can be easily led, but they cannot be driven. To effect this, one or two of the herd are trained to hand-feeding. They soon recognize the rattling of the bucket, so that when the herd is wanted, the cry of the herdsman and the rattling of the bucket brings them home at a gallop.

Before being sold oxen are put into a reserve pasture which has been shut down in preparation for them, where they remain for some three months, and are hand-fed during this time with a mixture containing coco-nut meal, Indian cornmeal, and "middlings" with a small addition of salt and linseed meal, which binds the whole and prevents waste in feeding. The ingredients are made into a mess with water and hand-fed in about half-pound lumps, each animal receiving about three pounds at a time. The mixture is carried to the field in buckets, one man stands guard, while the remainder, taking each a certain number, see that

every animal receives its share. This feed costs about five cents a day or 6*s.* 3*d.* per month, and has the effect of putting on a nice clean finish to the animal previous to sale.

For crossing with other breeds there is no better animal than the pure bred Zebu, the cross with native stock giving excellent results. The half or three part Zebu heifers crossed with Devon, Hereford, or Polled bulls, give rise to a very profitable class of stock.

Jamaica has for years been a good customer at the Trinidad sales of pure bred stock, and is probably largely indebted to Trinidad importations for the improvement in her herds. British Guiana, Antigua, Grenada, Honduras, and Venezuela have also been purchasers, and as the export has been in no way restricted, the neighbouring Colonies have been able to take advantage of and to benefit by the Trinidad importations, a privilege of which they have not been slow to avail themselves. It is understood that in Jamaica half-breeds from the Zebu are in great demand and sell at considerable advantage as compared with the native cattle. The value of pure bred two-year-old bulls has ranged from £50 to over £100 in accordance with the size and points of each animal, the number offered and the number of buyers present. Pure bred heifers are now worth about 75 to 150 dollars, while bulls will probably range from 150 to 300 dollars. As, however, all cattle are sold by auction, this must must be taken as only an approximate estimate of the price they are likely to realize.

The Government Stock Farm in Trinidad is now entering on a wider phase of existence, and it is hoped that the management will be able to handle a certain number at least of all the most useful class s of stock. In a short time additions will be made to the Zebu, Guernsey, Red Polled, and Hereford herds, from which it is hoped to secure acclimatized progeny possessing the best characters of the various breeds, and that the support afforded will enable the Trinidad Farm to maintain its position of being one of the best institutions of its kind and to become the stud farm of the West Indies.—*West Indian Bulletin.*

THE FODDER FOR INDIA.

MR B. F. CAVANAGH, Superintendent of the Agri-Horticultural Gardens, Madras, writes to us with reference to "Paspolum ailatatum."—Its native habitat is doubtful. Some authorities affirm that it is a native of South America while others claim Ceylon as its origin. The grass was first brought to the notice of Australians by the late Baron von Muller, who recommended it on account of its high nutritious qualities and its drought-resisting properties. A very interesting account of Mr. Williams' experiments with this grass is given in the "Agricultural Ledger" Series No. 33 (1901) No. I. Page 3. But the climate of New South Wales, where those experiments have been carried out, and the climate of the Indian plains cannot be compared. The most northern point of New South Wales is 32 degrees south of the equator, and again, their experiments were carried out not at sea level but at an altitude of from 400 to 500 ft. We have a small plot here, which we have to water regularly; otherwise, it would shrivel up. It flowers freely, but the seeds are barren. There is no doubt that at any elevation above 1,000 ft. and on any poor soil it will be worth cultivating and will pay, provided it has water. I received a letter from an Ootacamund correspondent in which he says "P. dilatatum is a valuable grass, slow of growth at first, but when once established it forms dense tufts 4 feet high, and seeds freely, "no doubt seeds collected at this elevation would be good." I have not heard of a single success on the plains. There is a small place just outside Bangalore, viz. Whitefield, where I believe if it was tried it would prove a sussess. There, I am told water can be obtained at 7 feet from the surface, which means that the ground would hardly ever get into the hard, dry state it does on the plains.

Re cultivation to form a good pasture at once. It requires from 6 to 8 lbs. of seed per acre. This allows for barren seeds, as there is always a percentage of failures. The ground may be prepared the same as for ordinary pasture and seeds sown broadcast. Again, 2 and 3 lb. may be sown to an acre, and left until it ripens its seeds; these will fall to the ground and germinate, with the result, a good thiok pasture. When once established it will choke all other weeds. Another way is to sow in nursery beds and transplant into drills 18 inches apart and the plants 6 inches apart. An acre of ground treated in this way reached a height of 5ft. and a test cutting produced 13 tons 3 cwt. Never sow in the dry season; either sow in showery weather or just before the rains. Seeds are obtainable from. Messrs. Law, Summer and Co., Swanston Street, Melbourne, Victoria, at 5s. 6d. per lb.

Re your correspondent's question:—

(1) I would advise sowing in nursery beds and transplanting when large enough to handle. If he is on the plains he will certainly have to water them; it does not require a rich soil. (2) To my knowledge, no experiments on a large scale have been carried out on the plains. The chief authori ies for this grass are the farmers of New South Wales and Victoria. The Calcutta Horticultural Gardens were the first to carry out experiments, but these would count for nothing, as the climate there is more genial, and they have always a supply of good fodder from Indian gra-ses. (3) It may be grazed green; none of it being wiry, cattle will eat any part of it, even from the crown to the seed head. There is no reason why it should not make good silage.

To sum up *P. dilatatum* will thrive on almost any soil, sandy or otherwise, provided it can obtain sufficient moisture. Salt water will not effect its growth, and it will stand the two extremes, heat and cold.

"NATURE TEACHING."—This mail brings us "with the compliments of the Commissioner Imperial Department of Agriculture for the West Indies," a copy of a clearly printed, campact little manual of some 200 pages including glossary, appendix and index, which should at once be revised, adapted and published by the Government of Ceylon for use in nearly all schools in this island. The full title of the book is:—

Nature Teaching based upon the general principles of agriculture, for the use of schools by Francis Watts, F.I.C., F.C.S., Assoc. Mason. Coll. Birmingham, Government Analytical and Agricultural Chemist, Leeward Islands.

The following extracts from the introduction indicate the purpose and use of the little manual:—

In the pages of *Nature Teaching* prepared by Mr. Francis Watts, F.I.C., F.C.S., and now issued as a Text book by the Imperial Department of Agriculture, an attempt is made to place in the hands of Teachers both in Elementary and Secondary schools a well selected, but co-ordinate body of information suitable to West Indian conditions, to be supplemented in each case by numerous illustrations and experiments in which the pupils themselves take an active part.

By a judicious combination of work in boxes and pots, and work in the open garden, a teacher should succeed in keeping a class well in hand without confusion or loss of time. In the absence of a school garden a considerable amount of instruction may be given by means of boxes and pots alone.

LION HUNTING IN ZULULAND.

AN EXCITING EXPEDITION.

WITHIN THREE YARDS OF A LION: A FAMILY OF SEVEN APPEAR: WILDEBEESTE, ZEBRA, AND HYENA: A BIG BAG.

We have received permission to publish the following letter written by Mr. C. Manning, of Mt. Edgecombe, describing a lion-hunting expedition in Zululand, in which he and a friend had a most exciting experience:—

Almost immediately on our arrival at the Ubombo, Leslie and I (Mr. Miller had not turned up), obtained the best information procurable from native sources, as to the usual lair and hunting grounds of the lions, which obviously lay up in the thick bushes near to where the herds of wildebeeste roam about on the open plains. These and the zebras (Burchell's) form the lion's ordinary bill of fare. We, primed with the above information,

ERECTED A SMALL SCHERM OF UKMINZA THORNS,

and a few strands of wire, in a very likely-looking donga, fringed on all sides with fairly heavy timber. Our scherm was about three yards square, and we made ourselves fairly comfortable for the nights to follow, by means of a waterproof sheet, air pillow, and a couple of blankets each. We arranged the bait we had brought from Nongoma, 12 yards from the scherm, and awaited developments. I should have mentioned that, most unfortunately, the blue lights we had ordered through Mr. Miller had not come to hand, owing to his delay *en route*, and we had, therefore, to depend on the use of E C. powder to light up the scene when the lions should arrive. As the flash of the powder would be only momentary, and there was no moon until about 2 a.m., we, after some discussion, decided to use S.S.S.C. in our shot guns, and keep our ·303 rifles as an emergency.

The first night passed off without any event. Our living bait, to our consternation, remained absolutely silent, and we heard only the cough-like bellow of the wildebeeste all round us, varied occasionally by the weird cry of a prowling impisi (hyena). We had reckoned on our bait giving the lions some evidence of his presence, but no doubt instinct warned him from giving himself away, and he remained as silent as the Sphinx, and quite impervious to our occasional attempts to rouse him up. We put in time next day by shooting a wildebeeste bull each, and sent the meat to our main camp. The night following

THE DENOUEMENT

came off. We were aroused at 10 o'clock, and realised that the opportunity of our lives had come. I had only just raised myself on my elbow, and had not got hold of my gun, when above me, not three yards off, distinct against the skyline, loomed the body and large round head of a lion, who had evidently walked up to reconnoitre our scherm. It was only for an instant, however, for, satisfied, or the reverse, as to our vicinity, the lion glided off like a ghost into the darkness. I confess that, for those few seconds, my heart appeared likely to knock my ribs in. We could hear the savage, hoarse grunt of the lions, but the intense darkness veiled the scene only 12 yards from us, except for the occasional glow of a huge feline's eyes, which resembled the phosphorescent flash of the glow-worm. We had spread a quantity of powder on a box, and matches being handy, Leslie struck one, applied it to the former and night became day. Never shall I forget the scene which for a few seconds presented itself. The bait was still there, and at the first flash of the powder, from the carcase, on all sides, sprang lions, their tawny hides looking white as polar bears in the bright light. I fired at one huge brute, which was lying right across the carcase, and Leslie fired a bullet at one which bounded away to the right. Then darkness again—darkness made more intense by the bright glare of the preceding few seconds. What was happening? Were the startled lions rushing away to the deep and wooded hollow below us, or were we to feel the crash and impact on our slightly-built scherm, of some charging and wounded monster? It was impossible to say, and we sat tight, clutching our guns in hand, and awaiting events. Leslie had been handicapped by lighting up the powder, and did not therefore feel sure of the result of his shot, but I knew I had been on the mark, and a

LOW GRUNTING, AND ALMOST HUMAN-LIKE MOANING

near us told me that I had made no mistake. We expected no re-appearance of the lions that night, but, to our amazement, in less than 15 minutes from our shots, deep hoarse grunts, the rending of flesh and the cracking of bones, made it evident that the enemy entertained no idea of relinquishing the "spoils of war" It was now my turn to light up, but the powder had been too heaped up, and the flesh which resulted on my applying the match was barely momentary and so vivid that, for a few minutes, I was absolutely blinded and feared my eyesight had gone. Fortunately this was not the case; but I was effectually prevented from seeing anything of the lions. Leslie had fired, but apparently without any effect, for no welcome response answered to the shot. Darkness—Egyptian—and again the terrible uncertainty of what was happening, or what would happen. As seven lions were around (one brushed our scherm, as we found by the spoor next day), developments might be expected at any moment, but again we sat tight as wax and as silent and motionless as mummies, hoping that thereby we might yet get another chance if fortune were so kind. This proved to be the case and once more during this eventful night were we to hear the low murderous grunts and savage snarls of the fierce beats as they assembled and squabbled over the dead animal. We had an old Zulu kehla with us in the scherm and we decided in low, whispered undertones that, to give us an equal chance at the lions, Umgeschow should light up the powder. He did so, and the nitro being now more evenly distributed than before, the flash which resulted was the best of the three attempts.

ONLY FOUR LIONS

had returned, but I was able to put in a quick right-and-left at one of them as it sprang to the right of the carcase. Leslie also hit a big chap hard, as he broke away to the left. and we heard him grunting furiously down in the donga, and he had evidently, in his rage, turned upon one of his companions who had approached the wounded beast. My lioness, stricken to death, was meanwhile grunting hoarsely, and moaning *in extremis* hard by our scherm. Soon these sounds ceased, and the silence of the night was broken only by the weird and mournful cries of an owl, or the "kwawk" of some distant wildebeeste. Almost breathless we lay and hoped, but hoped in vain, for a further visit from the giant feline. Slowly the crescent moon rose over the tree-tops, about half past one, and just as its faint rays pierced the dark shadows around we heard the savage growling of a lion by the carcase, and felt sure that luck was once more with us. Not so, however, for silence soon reigned unbroken, and it was evident that one of the party of lions had come up, had winded us, and had then followed his companions down the valley to the Umkusi River. It seemed ages before this never-to-be forgotten night passed, and we were enabled by the wan light of the coming dawn to crawl out of our scherm, and find out what result had been achieved during those, the most exciting hours of our lives. This was soon seen, for there, within, respectively, 20 and 30 yards from the carcase,

LAY THE GRIM AND TAWNY FORMS OF TWO FINE LIONESSES.

They were both in perfect condition and looked the personification of brute strength with their massive limbs, as we shook hands warmly by them, and drained a flask of mountain dew to the goddess of sport.

Natives from our camp soon arrived, and we endeavoured, but in vain, to track Leslie's wounded lion, through the thick thorn bushes along the donga. Poor Leslie was nuturally terribly disappointed at losing his lion in this way, and I think you will understand my feelings as a sportsman when I say I fully sympathised with him in his hard and cruel luck. I have now little more to add *re* lions. Naturally we were exultant in the success of our plans, and I may add, by the way, that, had the blue lights come to hand, I am firmly of opinion that we

SHOULD HAVE BAGGED THE WHOLE FAMILY PARTY

of lions. We laid bait, and changed our scherm to other places, when we found that the surviving lions did not return to the carcase the following night. All in vain, however, and I may say, briefly, that we had no more luck, the remainder of the lions having apparently had their nerves so badly shattered that they cleared right away from that district. We slept in scherms for nearly a fortnight after the big event, and did all that the wit of man and native cunning could do to bring us to terms with more lions, but it was not to be, and Leslie had to return to Nongoma without retrieving his ill fortune. I am now also forced to throw up the sponge, and am of opinion, in the light of past experience, that lions in the Ubombo district are restricted to those mentioned, and that, had other and undisturbed packs, or even single lions, been about, we must inevitably have come across them, or at least seen their spoor about the neighbourhood. Fever is worse there than in any other part of Zululand, and poor Gold, clerk to the Ubombo Magistracy, contracted fever, and died after a few days of hut-tax collecting in the vicinity of our lion-shoot. So we shall be lucky indeed if we get off scot free. I have shot altogether about 200 head of game, buck, and bird, but my

BAG HAS BEEN GREATLY LESSENED BY DANGER OF BOER RAIDS,

and on account of our not firing shots while hunting, to avoid disturbing the ground.
—*Natal Mercury*. C. M.

PRODUCE. PLANTING, AND COMMERCIAL NOTES.

The wisdom of the policy of selling tea by means of

SECRET AUCTIONS

has been keenly debated from the first, and the controversy still goes on. We notice that the *Grocer* of last Saturday publishes a list occupying several pages of the marks of teas disposed of in secret, so that the retailer may, if he choose, trace these packages. Those who favour the new departure claim that, apart from the right of the producer to sell his teas in any way he may think fit, the publication of the sales has long been a sore point with many wholesale dealers, and has been one of the factors operating against higher prices. Some of those who believe that these secret sales are a mistake claim that a false impression as to the extent of the dealers' profits is thereby created, and that the wholesale trade will suffer in consequence. There is a letter in the *Grocer* of last week signed "Kandpore Tea Company," in which the writer takes exception to these secret sales on other grounds. They say: "This, we think, is one of the greatest blunders ever made by the wholesale tea dealers, *i.e.*, by a few of the leading houses who have prevailed upon the importers to try the system It is a blunder because this step is open to misunderstanding and misrepresentation: misunderstanding on the part of the misinformed daily press, which is publishing absurd and misleading articles; misrepresentation by some blenders, brokers, travellers, and others interested in doing wholesalers an injury. It is monstrous to represent wholesale tea dealers, as a class, as bloodsuckers, and secret sales as a scheme for adding to their already exorbitant gains. Nothing could be much further from the truth. Whose trade is suffering from inadequate profits more than the wholesale tea dealer's and who has been so much the grocer's friend in the way of credit-giving and otherwise as he has been? Not a few grocers finance their business mainly on the credit they take on tea and duty. This system of small profits and slow returns is, though a boon to the retailer, the reason for the hard times amongst the wholesalers, who in looking round for some means of bettering their terribly cut profits have hit upon this expedient of secret sales, an expedient, however, which will not help them, because it will not lessen competition. The whole trouble is due to the prevalent Yankee system of trading, which makes not only some dealers, but also some blenders, brokers, travellers, and grocers utterly selfish, untruthful, vindictive, and morally dishonest. The golden rule is in sad disuse nowadays; indeed, some men

devote half their thoughts to devising schemes for injuring their competitors. Unfair competition (including printed and verbal humbug, weight with package, and charlatanism) is the root of all evil in trade, and is more rampant in tea than in most businesses. We can write on this subject of secret sales without bias, as our trade is not in originals."

The "Daily Express," in commenting on these sales, is rough on the

TEA BROKER,

without regard to the question that some brokers are opposed to these secret methods. It says:—Failure appears to have attended the efforts of the London tea brokers to withhold the market price of tea from country grocers. Some of the inner reasons for the bad 'secret sales' system were given to an 'Express' representative yesterday by a member of the trade. 'The attempt to conceal prices,' he said, 'marks another stage in the downfall of the middleman, the broker who has stood so long between the importer and the retailer. The first step was the assault made upon the market by big firms like Lipton's, the Home and Colonial Stores, and the International Tea Stores, who are now represented at the public sales by their own buyers. After these came the man who gives you a teapot with your pound of tea, or a pension for your widow, or a quarter of a pound overweight. All these people are taking lots of tea off the market without troubling the dealers. As a natural consequence the latter have endeavoured to make up their losses by extra profit out of their sales to country grocers. But the country grocer is too wide awake to pay more than a fair percentage on the market price, and, with the help of his trade journals, and a list supplied by the Market Prices Company, has managed to hold his own. To demonstrate the possibility of doing business on a fair and equitable basis, the Market Prices Company has now offered to supply grocers with teas bought at public sale, the only charge being a 5 per cent commission, the company always handing over the original weight notes, invoices, or contracts to verify the actual prices paid."

With reference to the letter of "Kar Guzar" to the *Financial Times*, on the question of

TEA COMPANIES,

which we printed last week, Mr. George Seton, writing to our contemporary, says: "The letter of your correspondent, 'Kar Guzar,' on Indian tea companies comes at an opportune moment, and his suggestions are well worthy of consideration. Your own editorial remarks also are very much to the point. I would only add to them that shareholders in tea companies would gain much by keeping a close eye on your editorial columns. There is no doubt that the issue of a half-yearly interim report, or, even better still, the holding of a half-yearly meeting of shareholders, would be a great gain to shareholders both in the case of tea companies and, indeed, if any similar industrial undertakings which, like tea, are subject to sudden and great change in the degree of their prosperity. Your suggestion for an association of shareholders is one that has occurred to me, and I think the present moment would be a favourable opportunity for creating such a body. Such an association would, of course, be of little use unless it embraced a large majority of the shareholders in these companies, and it would also be necessary that it should have some official or representative as a centre round which shareholders might gather for mutual protection, and if you, Mr. Editor, could in any way assist in bringing about the formation of such an association you would do a great benefit to the industry. The difficulty would be in drawing in all the scattered shareholders, both large and small, throughout the country. In advocating the idea, I wish it to be clearly understood that it is not desired to interfere any way with the ordinary administrative duties and obligations of directors and managing agents. The chief object of the association should be to control the general policy of the companies whenever, in the minds of the majority of the chief shareholders, it appeared to be drifting into a wrong channel. As a case in point, I would merely instance the recent excessive garden extensions, which, by causing an abnormal increase of production, has brought about the great fall in the price of tea that has occasioned the present unfortunate and disastrous state of the tea industry."

Another correspondent, who signs himself "An Importer," says: "In reference to a letter signed 'Kar Guzar,' as I have considerable experience of

LIMITED COMPANIES,

I trust that a few remarks may not be out of place. I quite agree that reports should be issued within three months of closing of accounts, and in many cases it would be desirable to publish interim half-yearly reports. I question, however, the expediency of publishing or sending to shareholders the confidential reports made to the directors by managers or visiting agents. If such a custom were to obtain, there is a danger of reports being made merely with a view to publication. With all defence to the shareholders generally, I venture to state that comparatively few understand the business of tea planting, and it is highly probable that, if they were fed with continual reports as suggested, they would be misled, simply because they are not experienced in the matter. Moreover, I think such a system would lead to much more speculation in tea companies' shares, and that is most undesirable. Of course, any enterprise depending on corps is largely speculative, but I hold that those who are interested in tea companies' shares should do so with the idea of holding, and not of selling when there is a rise. We must expect occasionally to have depression in the tea trade as in every other trade, but, if investors are judicious in their selections, they ought not to lose their heads because of the present crisis, but 'wait till the clouds roll by.'"

"A feature of the tea trade in Toronto," says the *Canadian Grocer*, "is the samples of

INDIAN GREEN TEAS

that are being submitted to the trade this week. They are from the Dooars and Sylhet districts, and they are being offered at a most favourable price. But their chief recommendation is their quality. Those who have tested them say they are beautiful in style, and in cup quality exceptionally good. One dealer declares they are the finest he ever saw. Hitherto green teas of India shown here have not been properly made. But, however excellent the quality of the Indian teas may be, the attention of the public must be drawn to them if they are to become an important factor in the market, either in Canada or the United States."

It is but a poor consolation to tea planters to hear of the troubles of those who grow other products, but just at present it is difficult to discover anything very inspiriting about the position of either

TEA, COFFEE,

or sugar. The latter we know has been under a cloud for years, and so far as the West Indies is concerned, the planter of cane sugar, or what there is left of him, is endeavouring to imagine that the silver lining is somewhere about, even though he cannot see it. Coffee planting in India is not a pursuit which recruits the ranks of millionaires, nor does it satisfy the aspiration of those who engage in it elsewhere. In Brazil coffee planters are suffering from depression, while in less favoured climes there are various causes operating against the grower of coffee. The latest Consular report from Costa Rica shows that planters are making grievous complaint, notwithstanding the prices which prevailed here last year. Coffee

is still Costa Rica's staple product and most important article of export. The year was a good one for exporters. the average price paid by them to the growers for the berry in fruit being only £1 10 per fanega (400 litres), as against £1 11s per fanega in 1899, while the prices realised abroad were higher by 1½d per lb, the actual figures being—1899, net average value, 4½d per lb; 1900, net average value, 5¾d per lb. Growers complain, however, that at these prices coffee barely pays expenses, and it is possible that, if there is no improvement in the near future, many of the older farms and also those in inferior soil will be abandoned. The Consul remarks that, so far from any prospect of an advance in price, appearances all point the other way. The improvement in the coffee markets abroad was only temporary, and the prices obtained for the first part of the 1901 crop are, in many instances, as much as £1 per cwt less than those of the preceding year.

The attempt to cultivate

COTTON

in West Africa will be watched with interest. Experts are of opinion that the soil in some districts is congenial to the plant, and the similar attempt made many years ago failed more through lack of encouragement than anything else. The firm of Messrs. Elder, Dempster are said to be promoting experiments in British West African Colonies.—*B. and C. Mail* August 2.

AGAVE (ALOE) FIBRE INDUSTRIES IN INDIA.

We are greatly interested to learn from the *Madras Mail* of textile industries (extraction of fibre from Aloes) being started in both the Bombay and Madras Presidencies:—

"We read and hear so much from time to time of new textile industries being introduced or recommended for introduction into this country, and see, as a rule, proportionately so little being really and practically done, that it is positively refreshing to learn that aloe planting and the extracting of fibre therefrom on a commercial scale has actually been set on foot in the little District of Anantapur. Two years ago, an Agave Fibre Company was formed at Pawai, in the Bombay Presidency, and an area of 469 acres, 366 of which were occupied by a lake, were acquired for the purpose of carrying on the industry. Work was started with a swing, and now that a similar industry has been launched here, it will be of much interest to know how the Bombay experiment is getting on. It may be noted that this is not the first time that the Bombay Presidency has considered in a practical way the utilisation of Agave fibre, for in 1878, under the auspices of the Government of Bombay, an experiment was undertaken for the manufacture of paper at the Girgaum Paper Mill, but the experiment was most awkwardly and carelessly put through, and the result was, of course, a failure."

We shall watch very closely for the results of the experiments at Pawai and Anantapur, and even now to learn what machinery is employed and whether existing Agaves are being utilised, or the results of planting are to be waited for, would be useful.

A TEA DISEASE IN SOUTH INDIA.

Mr. C A Barber, Government Botanist, Madras, has written an interesting report on "A Tea Eelworm Disease in South India." The disease was first brought to notice in Madras by Mr. A Brown, of Glenfruen Estate, Devala. The virulence of the outbreak at "Glenfruen," says Mr. Barber, fully justified the fears expressed by the manager of the estate; but it was strictly localised, and there does not appear to be any great fear of the pest spreading. But Mr. Barber does not disguise the fact that, if the pest "once got a fair hold of a perennial like tea, it might spell disaster." The parasite is known as *Heterodera rediciola*, and is frequently the result of careless or insufficient cultivation, especially on old garden lands which have been allowed to run to waste. It was discovered in five different localities in the Wynaad and is said to be probably widespread. The disease causes an immense amount of damage all over the world, and Mr. Barber says there is little doubt that it has been a root parasite for centuries.—*Madras Mail*, Aug. 20.

SISAL HEMP AND OTHER FIBRE PLANT CULTINATION IN TRINIDAD.

BY MR. QUESNEL, 11TH JUNE, 1901.

I have seen, with a deep regret, some persons rejecting at first the idea of cultivating fibre plants in Trinidad as requiring too much capital and too costly machinery.

This is a great mistake. Yukatan is there as a proof of it, because the Indians of that country export now more than 100,000 tons, prepared with a very rough machine called "Raspador," a wheel of four feet diameter, working at 160 revolutions a minute. The cost of it cannot be, with horse gear, above $150. That machine is easy to move from one place to another. It wastes a certain amount of material, and is slow at work; but it is not the first time that the primitive appliance of the peasantry has succeeded better than costly machines and big capital, with their heavy interests and annuities. The Raspador gives net 333 lb. in ten hours. A machine for working three quarters of a ton would cost, with steam engine and the buildings to correspond, £1.200 at least, when five Raspadores would not cost more than £150.

A steam engine would not be moveable and could not be economically established where the area under cultivation would be less than 1,000 acres.

I take my data from various reports from Dr Morris, Imperial Commissioner of Agriculture, Barbados, and from Mr Richard Dodge, of the Washington Fibre Investigation Committee on account of the Government of the United States.

From them I come to the conclusion that the fibre plant gives a hemp of a value of £30 a ton in London, which I reduce to £14 a ton after allowing for discount, commission and freight, and also for cultivation and packing. This is less than the amount given in the reports referred to.

I take for planting five rows in 36 feet, that is to say, four at six feet distance and the fifth at twelve. I put the plants six feet apart in the rows. This gives me more than 1,000 plants to an acre. Each plant at four years gives forty leaves a year of a weight of 50 lb. of which four per cent turns into fibre, dried and white, or two lb. of fibre to a plant, or 2,000 lb an acre. £14 a ton is more than three cents a pound. I allow only 2½ cents a pound to make $50 an acre. Thus an acre producing net $50 yields double the results of 200 cacao trees on an acre, at ten bags per 1000 trees at $12 net (when 65s the London market quotation) or two bags, $12=$24. It is a great deal more than 20 tons of sugar canes to an acre at 9s a ton, leaving probably not more than 1s a ton to the cane farmer, or £1 an acre.

If an acre gives 2,000 lb a year, and a Raspador prepares some 333 lb a day—100,000 lb a year of 300

days—it will require 50 acres to produce sufficient fibre for one Raspador's work in one year, five Raspadores for 250 acres, 20 for 1,000 acres.

But what strikes me more is that I noticed that on all the sugar plantations, all the cacao estates, everywhere on Crown lands, there is a large extent of useless land, when not first class. Well, the fibre plants grow nearly everywhere except on absolutely barren lands. And immediately every one can foresee what is the future of Trinidad when all lands, unless barren, will be cultivated with plants yielding double what cacao gives: 1,000 acres of land for sugar canes giving 1,500 tons of sugar, will require (if I do not make a mistake) £37,000 worth of machinery, at least: and 1,000 acres of land for fibre plants will require only 20 Raspadores costing £600, and will give yearly, at $50 or £10 per acre, £10,000 sterling to repay cost of land and of contracts.

But no industry can be established with safety if it is not started with economy and perseverance or if any one is discouraged because purchasers do not come from abroad to buy the first pound before it is ready. I believe that this, and five or six years' gambling in the London Exchange, have stopped the first attempt made in Tobago and in the Bahamas some ten years ago. But the machines have been greatly improved during the last four years, the prices after fluctuating during the time of speculation between £13 and £75 have become steady at £30, and the plants, ten years old now, are everywhere giving sprouts from their roots, and seeds from their poles.

The Agricultural Society is being called upon to decide regarding the introduction of hard-working immigrants from Teneriffe. Can we find a better basis for settlement by free companies of these free people, in a free country? Profitable contracts could be offered to them on landing at the Quay at a rate of $25 an acre, five after brushing, $5 after planting, $15 on delivery on fourth year. Each contractor would not receive more than 12 acres to be planted in three years—four acres a year. As there is very little trouble in cultivating the fibre plant when it is a year and a half old, every year each contractor could receive some four acres more. In five years he would have planted 20 acres and from the fourth to the ninth year he would receive $500, whereas 12 acres in cacao, or 2,400 trees, would give him only $480 in the same time.

Port-of Spain, 11th July 1901.

—*Journal of the Jamaica Agricultural Society.*

"NEGRO NILELAND AND UGANDA"

Form the subject of an instructive paper (with map) in the latest *Quarterly Review*, and the strong hope is expressed that, by the wealth of its products and the mart offered for trade, this land of the greatest lake and the greatest river in Africa will soon justify its being brought under the British sphere of influence. Reference is made to the recent discovery by the head of the Scientific Department of the Uganda Protectorate (Mr. Alex. Whyte, so well-known in Ceylon, and who has surely taken a new lease of life since he went to East Africa) of the "potto lemur," and although "the plagues of Egypt," indeed of the tropical world, seem to be concentrated in one part of the land, yet there are most glowing accounts of beauties and advantages as may be judged from the following extracts:—

The Uganda Protectorate is the crown of tropical Africa; it contains all the wealth, all the wonders, all the beauties which are elsewhere widely scattered or are found in incomplete assemblage. Here we have the mightiest of African rivers and the largest of African lakes, a lake, moreover whose shores—in its northern part, at any rate—exhibit many an earthly paradise. Here we have cataracts like the Ripon and Murchison Falls, only surpassed in beauty by the Victoria Falls on the Zambezi, and in size by some of the Congo falls; a mountain-range—Ruwenzori—whose perpetual snows extend for twenty miles; an extinct volcano of extraordinary grandeur—Mount Elgon; forests in Uganda, in Unyoro, and in Toro, which in tropical luxuriance rival those of the Amazons, woods of conifers (on the Mau Plateau), recalling the scenery, temperature, and aroma of the Black Forest. Over the western part of the Protectorate coffee grows wild. Indiarubber, incense, acacia gum, and most other vegetable products characteristic of Africa are found in abundance. The rivers—even the small mountain streams—and the lakes abound with fish of excellent quality. This land of Beulah, with a climate often delicious and scarcely anywhere disagreeable, would be an earthly paradise if it were not for the fever—malarial or hæmaturic—which is prevalent in most parts below an altitude of 6,000 feet. Fortunately, the greater part of the eastern third of the Protectorate actually lies above an average of 6,000 feet, ranging between that altitude and 10,000 feet on its plateaux, with here and there a peak ascending to still greater heights. A not inconsiderable proportion of the western area of the Uganda Protectorate also rises to plateaux fairly free from malarial fever. Whole districts of this description have been found so absolutely healthy by those Europeans who have resided there for any length of time that there is good reason to hope that we have discovered here a portion of Equatorial Africa which may be colonised by the European races; the more so because inter-tribal warfare and other causes have depopulated this temperate region to a considerable extent, leaving large tracts of it without a single human inhabitant.

All Negro Nileland, with the exception perhaps of the forests near the Congo watershed, is suited for the breeding of cattle, horses, goats and sheep. There is apparently no tsetse fly, and as yet no dreaded horsesickness has arisen to prevent the keeping and breeding of horses, mules and donkeys. Donkeys indeed are native to the land, the wild ass from which our domestic animal is derived being found in the eastern territories of the Uganda Protectorate and in the eastern parts of the Nile basin. Camels are likewise kept in the regions round Lake Rudolf and the south west of Abyssinia. It is in fact a stock rearing country of the very best. A steamer placed on the Victoria Nyanza could convey goods round two thousand miles of coast to the railway terminus on Kavirondo Bay, where, before many months are over, the British Government railway from the Indian Ocean will have attained its first objective in placing the Victoria Nyanza within thirty-six hours' journey from Mombassa and three weeks' from London.

Ivory is the present wealth of all this land—ivory in quantities unknown, unheard of, in any other part of Africa; and elephants are still living in such enormous herds as to stand in no danger of extinction from past excesses on the part of ivory-hunters, while it is now made a misdemeanour to shoot a female elephant, or a male elephant carrying tusks less than ten pounds in weight. In the marshy districts, which are uninhabitable by man and which are spotted all over Negro Nileland (as though on a map one had dropped a little wet sponge at intervals), the elephant will find pre-

serves where he will not be in rivalry with human cultivation, and yet will be within reach of the authorised sportsman and the *keddah* manager—for there is no reason why attempts should not be made after a time to drive the young wild elephants into domesticity, as is done in Siam, Ceylon, and India. Grain will be another staple of Negro Nileland—dhurra, maize, millet on the Nile flats and in the lowlands; wheat, barley, and oats, on the plateaux and on the mountains. Already wheat has penetrated southward from the Arab Nile and is cultivated on the highlands north of Lake Rudolf. Enormous quantities of other grains already familiar to African cultivation are produced in these lands. Bananas grow by millions in Uganda and Unyoro. In all the upland countries such as those of the Bahr-el-Gazal watershed, Uganda, and the mountainous region between Uganda and Lake Rudolf, the coffee shrub grows wild, and wild coffee is chewed by natives as an agreeable bitter. The lakes and river swarm with fish of excellent quality. Nor is salt wanting to season these food-stuffs; for within British territory there is a salt appanage of Lake Albert Edward, and there are salt deposits along the eastern shore of Lake Albert, and on the shores of Lake Rudolf. In many districts ground-nuts grow so abundantly that quantities of vegetable oil of fine quality are produced. In the forests of Mount Ruwenzori, and on the plateaux and mountains to the north of the Victoria Nyanza there are conifers growing which produce timber of the finest quality for building purposes. In the forests of Uganda and the Bahr-el-Ghazal watershed, indiarubber, dye woods, ebony, and building timber are abundant.

RUBBER IN UGANDA.

We are glad to see that Sir Harry Johnston is opposed to the granting of exclusive concessions of rubber forests in Uganda to individuals or associations, and advocates the plan of allowing the natives under proper supervision to gather the rubber and sell it to whom they will.—*Westminster Budget*, Aug. 2.

COFFEE PLANTATIONS IN THE CONGO

A Belgian correspondent, who has served in the agriculture and forestry department in the Congo Free State, writes to explain the means by which the Congo authorities have created the shadow rather than the reality of a great industry in coffee. In their haste to fill the country with extensive plantations they gave rewards for every area planted with more than a certain number of trees, the trees to be no less than 75 centimètres in height. The sum of money awarded was to be shared between the magistrate and the planters of the district. The result has been that trees have been planted everywhere and anywhere, in all kinds of soil and without any kind of care. Enormous numbers of trees have reached the requisite height for the reward, but either from subsequent neglect or conditions unfavourable to further development they have stopped short of fruitful maturity. Our correspondent alleges that the planting of cocoa has not been in any degree more careful, and that the whole policy of the Congo authorities towards cultivation is compounded of a foolish lavishness—as in the case of these rewards—and a very short-sighted economy. —London *Times*, Aug. 1.

PARA RUBBER FOR RATNAPURA.

LEASE OF 1,000 ACRES.

Mr. Margetson, a gentleman who arrived in the Island from South Africa about two months ago and has had extensive experience of Para Rubber cultivation in South Africa, and is confident of being able to grow it easily in Ceylon, has leased a thousand acres of land in the Ratnapura district for a period of forty-nine years, and means to plant it fully with Para Rubber. The land in question is known as "Nimitigala Nindagama," belongs to Idumalgoda Kumarihami, and is situated about twelve miles from the town of Ratnapura. Mr. Margetson means to import the best seeds from South Africa, and will proceed on the most approved lines.—Ceylon "Standard." [In view of the above announcement we quote as follows from our work, "All about Rubber and Gutta Percha":—

AFRICAN SOURCES OF SUPPLY.

At the Cape of Good Hope there are many species of Euphorbias which are said to yield a substance very similar to Cattimanduo, but hitherto I have only been able to see fragments, and thus have been precluded from making any experiments. Like the *Euphorbia officinalis* the juice is so acrid as to give intense pain and irritation to any part of the body with which it may come in contact, especially the eyes and nostrils. Dr J Combie Brown, whilst holding the post of Government Botanist at the Cape, paid much attention to the subject, and favoured me with much correspondence upon it. Our united efforts bore no fruit. The substance has been well spoken of as an anti-fouling dressing for ship's bottoms. Mr Baxter, whilst on the Niger Expedition, collected a specimen of *Chrysophyllum* (Sapotaceæ) yielding a substance like gutta-percha, but no specimen seems to exist. Tropical Africa should indeed be rich in such substances, and doubtless such will prove to be the case when careful search and enquiry is made. With regard to the whole question of the Pseudo Guttas, Balata should most certainly receive attention, and efforts should be made by the Government to introduce it into Ceylon and elsewhere. Pauchontee, too, should receive attention, and the possibility of the utilisation of the rest of the group not denied till further trial has been made.—J. C.—*Indiarubber and Guttapercha Journal.*
—Ed. *T.A.*

COCONUTS IN THE WEST INDIES.

In Trinidad coconut trees thrive particularly well, and especially so in the district of Mayaro, where the finest cocal, or coconut walk, has curiously planted itself from nuts orignally cast ashore from a wrecked vessel. These trees bring forth a bunch of nuts every month, and the bunches average nine nuts each. Sixty good nuts go to a gallon of oil, and this gallon averages $1 or 4s 2d. The yearly value of a coconut tree is therefore roughly set down at $1, from which it will be seen that nine thousand six hundred coconut trees are sufficient of themselves to pay £2,000 interest, at eight per cent on £25,000. In Jamaica eight and and nine inland-grown coconuts go to a quart of oil, coast nuts six to eight; thus, it seems as if a gallon of oil could be produced from half the quantity of nuts here than in Trinidad—From *The Journal of the Jamaica Agricultural Society*, for July 1901.

TEA SEED OIL AND CAKE.

MR. MANN'S REPORT TO THE I.T.A.

Calcutta, Aug. 22.—Mr. Harold Mann, a chemical expert, has submitted to the Indian

Tea Association a report on tea seed oil and oil cake, which concludes as follows :—"While I think there would be a market for oil, if it could be obtained in quantity, and fairly cheaply, it must for the present be a local one, and the material could hardly compete with oils already in general commerce unless it be for the production of superior soaps. As a lamp oil it has distinct advantages, which should recommend it for local consumption. The pressed cake is useless for feeding, and forms an inferior manure, though one quite good enough to apply to land and also to cart for some distance provided the cost on the garden does not exceed 8 to 12 annas per maund It would probably be useless as an insecticide, both as cake against certain caterpillars, and as a decoction which might replace that of wild fern now used in Dibrugarh against red spider."—*Madras Mail*, Aug. 22.

TWO QUEENSLAND PLANTS (PESTS!) REFUSE TO APPLICANTS FOR INDIA.

The Agricultural Adviser in Queensland (Mr. P M'Lean) has received two applications from India, which in view of the experiences in Queensland, appear peculiar. In one case some specimens of the water hyacinth are required for ornamental ponds near Madras, and the application points out that all precautions will be taken to prevent it spreading. In another case some seed of the weed, *sida ritusa*, are asked for. Mr. M Lean has declined to be the medium for probably affecting India with such pests, (says the *Queenslander*). Those who saw the water hyacinth in the Brisbane River after the recent fresh, and who can realise what a pest it has become in the upper reaches of the stream, and those also who know the tenacious and prolific nature of the weed of which seed is asked, will commend Mr. M'Lean's decision. —*Melbourne Leader*, Aug. 3.

BOLIVIA AND AMERICA.

(Special to the "*India Rubber Journal.*")

We are in receipt of information of such an astonishing character that were the source of information not so good, we would be compelled to hold it back for further investigation. We are assured, however, from indisputable evidence, that this great deal is in progress, if not already finished.

The abundant resources of Bolivia are not likely long to remain unexplored. By a recent agreement between the Brazilian and Bolivian Governments, an immense territory covering over 75,000 square miles in the northern province of Accra is now in the undisputed possession of the latter Government. The boundaries of the territory are these: On the N.E. the frontier line between Bolivia and Brazil; N.W., W., and S.W., the frontier line of Bolivia and Peru; S.E., the river Abuna, and a line from its fountain head to the junction of the Inambary and the Madre de Dios rivers. The area covers one of the richest rubber-producing countries of the world.

This concession has been acquired by one of the most powerful financial groups in America, who will practically stand possessed of all rights, with the Bolivian Government as partners. Custom-houses, stores, steamers, etc., will be established throughout the territory.

The possibilities of the territory are best illustrated by the fact that in January and February, 1899, with one Custom House, something like £80,000 was collected in duties, and at present the practically undeveloped territory is producing rubber to the extent of 2,000 tons a year.

Not only are the trees in this district very numerous, but it is common knowledge among the rubber gatherers that the yield given is immensely greater than on the Amazon. The rubber estates of Para knew this to their cost when the difficulty of obtaining labour began, for the gatherers would far sooner travel up and obtain the rubber with less than 50 per cent of the ex rtion.

And now, having given the facts which time will substantiate, it may be interesting to wander into the realms of conjecture and try to discover the leading motive in this agreement. Is this group of financiers, whose strength is absolutely beyond cavil, entering into this agreement for philanthopy, or to creater free market in raw rubber for the benefit of the whole community of rubber manufacturers? Or is there any connection between them and the Rubber Trust of America?

It is impossible for us at the moment to substantiate the statement that the Rubber Trust is the controlling power in this group of financiers, but, like the Scotsman, we "hae oor doots," and we fancy that our view will be shared by many who know something of the inside working of the organisation.

Sir Martin Conway, in his book which was published last week, "The Bolivian Andes," has a chapter upon the rubber industry. It may be worth mentioning here that if we were told Sir Martin Conway had an interest in this enterprise, we should not feel greatly surprised, and should be rather glad of the fact that an Englishman had a finger in the pie.

This is what Sir Martin Conway says: "My position in Bolivia as a scientific explorer commended to the consideration of the Government, placed me in an exceptionally good position for obtaining information about the undeveloped resources of the country, and the attitude of the leading men towards foreigners and foreign enterprise. I soon learned that it was the desire of men of all political parties to attract foreign and particularly English and United States capital, in order to open up the great mineral and other wealth of the country, which local capital does not avail to exploit." "Land or claims in old occupation, but now unworked or little worked, are liable to have doubtful titles, which, however, it is no one's interest to dispute till some wealthy individual or corporation buys them from the apparent owner and spends money on their development. But lands such as the rubber forests, to which I shall presently refer at length, which have never passed out of the public domain into private ownership at all till quite recently, and under the provisions of Acts of the Legislature, are now owned by an indefeasible title which no one attempts to dispute. "Up to the present time, however, none of the titles have been contested and it does not appear to be the interest of any individual to contest them; while the chief interest of the Government is to induce men of capital to work the ferests, introduce immigrants, develop lines of communication, and so increase the general trade and prosperity of the country. It is not likely, therefore, that the Government will attempt to upset titles, even if they are not absolutely satisfactory, provided that the forests in question are properly worked. "It must be borne in mind that the area under discussion does not include the whole Rio Beni and the region of the plains about it, but only the upper part of that region in and about the foothills of the Cordillera. The rubber that comes from the lower Beni is carried away to the eastward, and emerges into the light of commerce as Para rubber. It is only the forests of the lowest eastward Cordillera slopes and the plains immediately at their foot that are comprised in the Mollendo district. The rubber trees there are Hevea

Lutea, a large forest tree, approximately as big as an average English elm. These trees are self-planted. They grow in clumps, or estradas, of from 100 to 150 together, and these clumps rise well above the other forest trees, and can be seen from afar, so that the richness of any area can be judged by a general oversight from a commanding position.

"The cost of production, in Bolivian dollars, of 100 lb of Mollendo rubber in the Mapiri forest is as follows:

Paid to contractor, per 100 lb	73.00
Loss in weight, 10 per cent	7.30
Freight from the forest to Sorato Town ..	5.00
Commissions and road tolls	.60
Cost of administration	10.00
Sacking, packing, commission, and freight to Chililaya, on Lake Titicaca ..	2.20
Freight, insurance, and all incidental expenses to London	12.00
	110.10

"Or, reckoning the Bolivian dol. equal to 18d, the cost of a pound of Mapiri rubber put down in London is 19 82d.

"From the books of two other forest owners in the same neighbourhood, I find a slightly higher cost, 20.16d per lb. The present price of this rubber in London is about 4s per lb.

"Coming now to a consideration of the possible supply of rubber to be drawn from the Mollendo forests, we enter a region of conjecture, for, of course, the trees have not been counted, not even the number of estradas. A part of one estate has been recently proven to contain 6,410 estradas (961,500 trees), when, according to the original estimate, the whole estate contained only 500,000 trees. Twenty million trees may be taken as the lowest probable limit of the number of trees, while they may not improbably turn out to reach 50,000,000, or even more. Now, in the season 1897-8, the amount of Mollendo rubber exported was 491,037 lb, which, at 3 lb per tree, represents the yield of only 163,695 trees, and the same number of days' labour at 3 lb per man per day. If one Indian is taken as working for three weeks, it represents the labour of only 7,795 Indians out of a population of 300,000 in the Department of La Paz. The possible increase of output is thus clearly enormous. How is it to be brought about?

Sir Martin's answer to this query is that the forest proprietors must make roads for themselves, for the Government is too poor yet; the rubber-producing provinces must be governed wisely and well, with scientific foresight. The query, we imagine, was half answered before it was asked.—*India-Rubber Trades' Journal*, July 22.

COFFEE IMPORTS AND EXPORTS.

We recently showed that, according to the Customs Accounts for 1900, about a million lb. of coffee approximately, was imported into, and exported from, Ceylon last year. But we learn from a Colombo merchant that a certain quantity of coffee from Southern India is brought over in "parchment," to be "cured" and re-exported home from Colombo, there being no import duty (as in the case of tea) to interfere with this trade coming to our port for the benefit of the men, women and children employed in local mills.

Now, what we want to point out to the Chamber of Commerce and Planters' Association is that no notice is taken of the coffee referred to as "re-exported" in the Customs Accounts. On the contrary, all the imports are put down as for "home (local) consumption," and all the exports as the "produce of Ceylon"! But it is evident that, by whatever quantity came here from Southern India to be "cured," the figures for local *consumption* and *production* are wrong for 1900. This is a matter of some importance and should be looked into; for both the Chamber and Association publish the coffee exports as indicating the local crop. The fault may not be with the "Customs," but rather with the owners or agents of the coffee brought here to cure, in that they have failed to declare to the Customs that the same was not for local consumption, and again, in exporting, that it was not the produce of Ceylon.

PLANTING NOTES.

COFFEE.—Dr. David B Reader, of Chicago, condemns the habitual use of coffee as harmful, and his opinion is supported by the *Journal of the American Medical Association.* Coffee is said to produce serious nervous disorders, and is considered by some physicians to have a worse effect than alcohol. It is urged that Americans consume too much coffee.—*Rio News.*

CUSTOMS INSPECTION OF TEA.—We remarked yesterday that what Ceylon chiefly wanted was a "standard" below which no tea should be allowed to be exported; but the same standard could, of course, be applied to imports when Ceylon is made a "free port" in respect of tea, and then rapidly becomes the greatest Tea Port in Asia.

TEA COMPANY MEETINGS.—Two important Tea Company meetings were held in Colombo today, the Hapugahalande Company (of which Messrs. Lewis Brown & Co. are agents) declaring a dividend of 5 per cent. and the Wanarajah Company (Messrs. Baker & Hall, agents,) paying 12 per cent for the half year or 17 per cent for the full period. This we consider a very splendid result indeed in these depressed times and reflecting the greatest credit upon Mr. Keith Rollo and the other members of the staff, as was duly recognised by the shareholders today.

COCONUT OIL—It is curious how reports seem to get about, that are so utterly unfounded, that the people concerned are often the most astonished at the news. The Secretary of Central Trelawny Branch reports an interview with the manager of the Kokal Company at Rio Bueno (See Branch Notes.) It was currently reported and mentioned at one of the meetings of the Board of Management of this Society that the Kokal Company were going to shut down; that they could not get nuts enough, or that they could not get them cheap enough, or make enough oil from them to make them pay. But Mr Scott reports that the manager has said to him that anyone saying the Company was going to stop business is very far wrong, that they have contracts for two to three millions of nuts, that they do not buy less than one thousand at a time, (which shows that they can get plenty,) and that they pay thirty shillings per one thousand for nuts, and for husked nuts forty shillings per one thousand. We are glad that the enterprise is prospering.—*The Journal of the Jamaica Agricultural Society*, July 1901.

INSPECTION OF PEARL BANKS.

CAPTAIN J. DONNAN TO THE HON. THE COLONIAL SECRETARY,

Master Attendant's Office,
No. 62. Colombo, April 15, 1901.

SIR,—I have the honour to report on my recent inspection of the Pearl Banks, during which I examined the following banks :—

BANKS IN THE NEIGHBOURHOOD OF ARIPPU.

2. Cheval Paar, Modragam Paars North and Sonth, Periya Paar, Periya Paar Karrai, Outer Vankalai Paar, Kallatidel Paar, Jaggerboom Paar, and Kondatchi Paar.

BANKS IN THE NEIGHBOURHOOD OF KARAITIVU ISLAND AND DUTCH BAY.

3. Dutch Modragam Paar, Karaitivu Paar, Alantura Paar, Muttuvaratu Paar, Moodelicoolie Paar, Hamilton's Muttuvaratu Paar, and Steuart's Paar fished in 1832.

BANKS IN THE NEIGHBOURHOOD OF CHILAW.

4. Udupankare Paar, Muttubundi Paar, Jokenpiddi Paar, Nagul Paar, Wanatty Paar, Karakupane Paar, and Chilaw Paar.

BANKS IN THE NEIGHBOURHOOD OF MARAWILA.

5. Marawila Paar Sonth and Ooloowette Paar.

BANKS IN THE NEIGHBOURHOOD OF NEGOMBO.

6. Negombo Paar, Muttooparawatte Paar, Haly's Paar; and prospecting on a new spot where I found a fine rocky bank very suitable as regards position and depth of water for pearl oysters to settle upon, but unfortunately no oysters were found in it. This rocky bank is a new discovery.

7. I found pearl oysters on the Cheval Paar, Periya Paar, Periya Paar Karrai, Outer Vankalai Paar, Modragam Paars North and South, Kondatchi Paar, Dutch Modragam Paar, Karaitivu Paar, Alantura Paar, and Muttuvaratu Paar. No oysters were found on the other banks.

CHEVAL PAAR.

8. On the west side of this bank three detached beds of pearl oysters were found, one on the south part, one on the centre part, and one on the north part. The bed on the south has an area of about 151 acres, estimated to average 23 oysters to a dive, and to contain about six millions of oysters; the bed on the centre part has an area of about 1,000 acres, estimated to average 30 oysters to a dive, and to contain about 54 millions of oysters; and the bed on the north part has an area of about 534 acres, estimated to average 21 oysters to a dive, and to contain about 20 millions of oysters.

(*a*) These three beds total up for the west side of the Cheval an area of about 1,685 acres, estimated to contain about 80 millions of oysters.

(*b*) On the east side of this bank two detached beds of pearl oysters were found, one on the sonth side and one on the north side. The one on the south side has an area of about 2,523 acres estimated to average 34 oysters to a dive, and to contain about 155 millions of oysters; and the bed on the north side as an area of about 636 acres, estimated to average 37 oysters to a dive, and to contain about 42 millions of oysters.

(*c*) These two beds total up for the east side of the Cheval an area of about 3,159 acres, estimated to contain about 197 millions of oysters.

The total for the whole Cheval Paar is an area of 4,844 acres, containing 277 millions of oysters.

(*d*) The area of oysters in March, 1900, was about 5800 acres, so that the present area is less by 16½ per

cent. No estimate was then made of the number of oysters on the bank, as they were too young to be estimated.

(*e*) The age of the oysters now on both sides of the Cheval are similar, 1½ to 2 years. The oysters on the east side are somewhat larger than those on the west side, and therefore look older. I have noticed however on previous occasions that oysters on the east side Cheval grow larger in size and more rapidly than those on the west. I have no doubt that the oysters now on both sides of the Cheval are the same oysters that were found on it in March, 1900. They were then all on the west side of the bank, only two small insignificant patches being on the east side. It therefore seems that many of the young oysters must have migrated from the west side to the east, or were probably drifted over by the effect of the last south-west monsoon, thus accounting for there being now fewer oysters on the west side, and so many more on the east side of the bank, than there were in March 1900.

PERIYA PAAR.

9. On this bank a bed of young oysters from 12 to 18 months old was found, having an area of about 557 acres, estimated to average 18 oysters to a dive, and to contain about 20 millions of oysters. In March, 1900, the area of the bed of oysters on his bank was about 2,000 acres, and therefore it is now diminished by 72 per cent., with a corresponding loss of oysters. There seems to be therefore very little hope of the oysters now on this bank being found on it next March.

PERIYA PAAR KARRAI.

10. On the sonth-west side of this bank a bed of oysters from one to two years old was fonnd, having an area of about 248 acres, estimated to average 20 oysters to a dive, and to contain about seven millions of oysters. This bank has not been fished since the years 1835 to 1836. Oysters are very seldom found on it, but the present stock of oysters may possibly come to maturity.

OUTER VANKALI PAAR.

11. On this bank two detached beds of oysters from one to two years old were found. The beds lie close to each other and, combined, have an area of about 273 acres, estimated to average 26 oysters to a dive, and to contain about 12 millions of oysters. In March, 1900, this bank had a bed of young oysters in abundance from three to six months old, of an area of 564 acres. Now the two beds of oysters on it are only half that area, showing a loss of 50 per cent. in one year. This bank seems to be quite as unreliable as the Periya Paar.

NORTH AND SOUTH MODRAGAM PAARS.

12. On the north bank a very small patch of oysters about two years old was found; and on the south bank a small scattered patch of pinna shells with oysters of two years old attached to them were found. These two patches of oysters are quite insignificant.

KONDATCHI PAAR.

13. On this bank two detached beds of pearl oysters from 1½ to 2 years old were found, having a combined area of about 196 acres, estimated to average 39 oysters to a dive, and to contain about 12 millions of oysters. It is said that oysters on this bank are deficient in pearls, and therefore never become worth fishing, but I presume that character applied to the old Kondatchi Paar, which lies much nearer to the shore, and has less water on it than the present bank, which is not far from the east side of Cheval Paar, and I see no reason why the oysters on it should not become as valuable as on other banks, if they remain on it.

DUTCH MODRAGAM PAAR.

14. On this bank two small detached beds of pearl oysters from 1½ to 2 years old were found, having a combined area of about 51 acres, estimated to average 21 oysters to a dive, and to contain about 1¾ million of

oysters. The bed of oysters on this bank in March 1900, was about 386 acres in area covered with young oysters. Since that time the oysters have rapidly disappeared from the bank, and therefore there is little chance of any oysters being found on it a year hence.

KARAITIVU PAAR.

15. On this bank a fairly large bed of pearl oysters six to twelve months old was found, having an area of about 234 acres, estimated to average 40 oysters to the dive, and to contain about 30 millions of oysters. This bank has produced mature oysters before, some having been fished from it in December, 1889, and in April, 1890, and therefore there is no reason against a due proportion of the young oysters now on it coming to maturity.

ALANTURA PAAR.

16. On this bank a small bed of pearl oysters 12 to 18 months old was found, having an area of about 46 acres, estimated to average 33 oysters to a dive, and to contain about five millions of oysters. A very small bed of mature oysters was found on this bank in February, 1892, and therefore there is a likelihood of a due proportion of the oysters now on it coming to maturity.

MUTTUVARATU PAAR.

17. There is an extensive bed of pearl oysters on this bank from 1, 1½, to 2 years old, having an area of about 1889 acres, estimated to average 51 oysters to a dive on the northern portion of it, and 31 oysters to a dive on the southern portion, and to contain about 178 millions of oysters. The area of this bed of oysters in March 1900, was about 2,020 acres. The present configuration of the bed shows that a large area on the north-west side of the southern portion of the bank has been completely cleared of oysters since March, 1900, and this accounts for the present deficiency in area as compared with that of March, 1900. On the other hand, the oysters on the north part of this bank have spread a little more to the north-east than they were before.

(No. 18 appeared in last night's issue)

19. On several occasions during the inspection when at anchor on pearl banks the crew of the vessel caught some rock fish from about 5 to 15 lb. in weight. The stomachs of these fish were found to contain nothing but fragments of pearl oyster shells and other shells, some of which must have required considerable pressure to crush them, and on some occasiods I saw from the deck of the vessel swarms of fish moving about near the bottom. I have no doubt that rock fish are chiefly responsible for the destruction of young pearl oyster beds, and I firmly believe that all that is necessary to preserve the oyster beds and to increase the number of pearl fisheries is to devise some practicable means of protecting young oysters up to the age of two years or more from the attacks of such fish.

20. There is no lack of pearl oyster spat in the neighbourhood of our Northern Pearl Banks, as young oysters have been frequently found on some of the banks, but none left when the same bank has been examined the following year. Such disappearance has generally been attributed to migration of the oysters, but I am however convinced that the chief cause of it rests with the rock fish.

No. 21. (Appeared in last night's issue.)

22. I annex for facility of reference a tabulated statement of the pearl banks on which beds of oysters have been found, and of their area and estimated number of oysters, also an explanatory note of how the estimates have been framed.—I am, &c.,

J. DONNAN, Inspector of Pearl Banks.

Tabulated Statement referred to, showing the Name of the Banks on which Pearl Oysters were found during the Inspection of March, 1901, the Area of the beds of Oysters, and the umber of Oysters estimated to be on them.

Name of Bank.	Area of Bed of Oysters in Acres.	Total estimated Numbers of Oysters on the Bank.	Age of the Oysters.	Remarks as to future Prospects.
Cheval Paar	4,844	277,000,000	1½ to 2 yrs	Prospects of fishery good
Periya Paar	557	20,000,000	12 to 18 ms	Bank unreliable
Periya Paar Karrai	248	7,000,000	1 to 2 yrs	Oysters likely to mature
Outer Vankalai Paar	273	12,000,000	1 to 2 yrs	Bank unreliable
Kondatchi Paar	196	12,000,000	1½ to 2 yrs	Bank has not produced a previous fishery
Dutch Modragam Paar	51	1,750,000	1½ to 2 yrs	Bank unreliable
Karaitivu Paar	234	30,000,000	6 to 12 ms	Oysters likely to mature
Alantura Paar	46	5,000,000	12 to 18 ms	Oysters likely to mature
Muttuvaratu Paar	1,889	178,000,000	1, 1½ to 2 ys	Prospects of fishery good
Total	8,338	542,750,000		

NOTE EXPLANATORY OF HOW THE ESTIMATE IS FRAMED.

The inspection vessel is anchored on the centre of the bank, and from it three buoys are laid out north east, south and west at ¼ mile, ½ mile and ¾ mile from the vessel, by a steam launch towing a patent log to give the distances. Four inspecting boats with crew and divers and coxwain in charge range themselves between the vessel and the quarter-mile buoy on north side, at equal distances apart, the outer or fourth boat being close to the buoy. They start on a circuit round by east keeping their respective places until they return to the starting point. The coxwains are supplied with diagrams of the three circular lines they have to make.* They mark on these lines the position of each dive that is made, and note down the nature of the dive, whether on sandy bottom, rocky bottom or oysters, each of these having a separate distinguishing mark, and at each dive on oysters the number of oysters obtainable to a dive and the number of square yards of bottom surface required to give that number of oysters are also noted. These particulars the coxwains obtain from the divers. When the first set of rounds has been made the boats range themselves between the quarter and half mile buoys and complete the second round in a similar to the first; and then a third similar round is made between the half mile and three-quarter mile buoys, so that when the third round is finished twelve equidistant circular lines have been dived upon over a circular space of 1½ mile in diameter, which is considered a fairly good day's work for the boats and divers.

When the boats come in I transfer the dives marked on each coxswain's diagram to mine, which has a circular line for all the tracks of each boat, and when that is done all the dives that have been made on

oysters, which have a special mark, show up most plainly. Then by running a pencil line round the outer edge of the dives on oysters the configuration of the whole bed of oysters is made clear, and as the circular lines are drawn to scale the area of the bed of oysters is easily calculated. Of course the area obtained in this way is only approximate, but it is sufficiently so for the purpose required.

Then as regards estimating the number of oysters on the bed. The percentage of blank dives, that is, dives without oysters, to dives on oysters, within the lines defining the bed of oysters, is ascertained, and a corresponding percentage of the whole area of the bed is deducted from the area, and the remainder represents the area for oysters; which area divided by the area to an average dive given by the divers produces the number of dives required to clear the whole bed of oysters; and that number of dives multiplied by the average number of oysters to a dive for the whole bed, as also given by the divers, gives the total number of oysters on the whole bed. Of course the accuracy of such an estimate depends upon the accuracy of the estimates given by the divers of the number of oysters obtainable to a dive and of the space cleared by a dive. Hitherto, however, my estimates framed in this manner have been less than the actual number of oysters taken up at a fishery.

J. Donnan, Inspector of Pearl Banks.

THE BAMBOO AND ITS USES.

Small coppices of bamboo form one of the most striking features of the farm, or estate—as fruit orchard in Natal—to use the more common coast designation. The bamboo serves many purposes. Primarily, as a shelter to the fruit crops from wind, it is of great value. Then it has very material and direct uses, and on this account Mr James urges general cultivation throughout the colony. On the coast, the growth, of course, is more luxuriant than can be expected in the upper and colder parts of the colony, but, as there are immense varieties—many excellent kinds growing in parts of Japan and China, where the winters are of intense severity—he believes that even for the coldest parts of South Africa suitable varieties might be found. When he first planted a few clumps, some twenty years ago, he did so with two objects in view: first, to give shelter; and, secondly, for selling to Indians as poles for their house construction. A ready sale for the poles is found from 3d to 1s each. The top height of his bamboos is about seventy feet, but there are kinds which reach in India 120 feet, the diameter at the base being one foot, and from sections of this thick part the Indians make barrels for oil.

The bamboo fruit box often seen in Durban, and sometimes in Maritzburg and beyond, was, so to say, invented by Mr James. He now has imitators, and he would be glad to see more. The boxes are of great strength, and, for permitting the free circulation of air among the fruit, they are perfect. The only sawn wood required is for the ends. The ends for the small boxes—weighing, with contents about one hundred pounds—are solid, while for larger boxes the ends are square frames, and are filled in with small bamboo slats. These boxes can be made of any size, and, as they cost less than half what boxes cost made of ceiling boards, they would serve admirably for sending certain kinds of farm or garden produce from a distance to market. The manufacture is simple, and, moreover, it is easily learnt by Indians, or by intelligent natives. The poles, which are taken from plants at least ten years old, are first allowed to dry. They are sawn to the required length, rather a small-tooth hand-saw being used. The lengths are then split; a bamboo of four-inch gives about five slats. For this work, the man I saw at work was using a plough coulter, which had had the upper end shaped into a handle by the village blacksmith. The trimming follows. This was done by an Indian, squatting on his haunches. His tools were a side axe and a bush knife. The latter was the implement most used, and the rate at which he trimmed the length was astonishing. The nailing of the boxes together was done with a sort of automatic ease and regularity. Mr James has always in training several of the hands, so as to avoid ever being in a fix for want of capable workers. Here are the prices:—

	s.	d.
The sawn timber ends ..	0	6
Hoop iron	0	1
Wire nails	0	1½
Labour and bamboo.. ..	0	6½
Total	1	3

Such is the cost of a bamboo box two feet two inch by one foot six inch, and nine-inch deep, which, filled with citrus fruit, weighs almost exactly one hundred pounds. The increase of cost is comparatively small, owing to the fact that the timber required for the ends is not solid, but, as explained, is made into a square frame. Mr James is convinced that a factory for the making of these boxes and other articles from bamboo would do a profitable business. The difficulty lies in the want of bamboo. It is not commonly enough grown to justify the manufacture being undertaken as an independent business. Ten years would have to go by before purposely-planted bamboos on a large scale would be fit for manufacture.

The bamboo is impressed into many more services by Mr James. The walls and doors of his sheds and stable are bamboo, the ladders for gathering fruit are bamboo, the water troughs for the poultry are bamboo, and even the handles for hammers and the kitchen Kaffir's axe are of bamboo. Most Colonists know how soon the handle of the last-named implement comes to grief, and when they learn that a bamboo handle successfully resists the bad treatment it gets from average kitchen boys, they will realise how tough must be the fibre of the bamboo. In some parts of the shed walls I noticed the "borer" was busy, while other sections were untouched. Mr James is of opinion that, if bamboo is cut at a certain time of the year, the "borer" makes no entrance, but what that time is he has not yet concerned himself to determine.

"Some people," said Mr James, "find the propagation of the bamboo difficult. I cannot say I have found any diffiulty. It should be planted as sugar-cane, the holes being a little deeper, and about thirty feet apart. The lengths planted should be about four feet or five feet, and great care should be taken not to injure the shoots. In damp rich soil they grow big and strong, and on dry poor soil, thinner and harder. Very poor, dry soil gives the best whip sticks?—*Natal Mercury*, July 13.

NILGIRIS AND BURLIYAR GARDENS:

ECONOMIC AND OTHER NOTES:

TAPIOCA—PLANTAIN FIBRE—CAMPHOR PLANT —RUBBER—CINCHONA.

(*From Mr. Proudlock's Administration Report.*)

In July 1900, cuttings and plants of four varieties of the Tapioca plant, which is largely grown in Travancore, were obtained by exchange from Mr M Labouchardiere of Trivandrum. One variety has not been established, but the remaining three varieties are now doing well at Burliyar. Mr Labouchardiere very kindly sent samples of the prepared Tapioca, together with an interesting note on the methods employed in Travancore in cultivating the plant and in preparing the flour from the tuberous roots,

Thirty-six plants of *Musa textilis*, Nēe, the species of plantain which is so largely grown in the Philippines for the production of the valuable fibre known in commerce as "Manilla hemp," were presented by Charles Gray, Esq., of Coonoor. They are growing vigorously at Burliyar, and also fairly well in Sim's Park, Coonoor. From the accounts of "Manilla hemp" given in the Kew Bulletin, Additional series II., I.—Vegetable fibres, and also in Volume IX. Part I, new series, in 1891, pages 57—62, of the journal of the Agri-Horticultural Society of India, the Curator had several of the two patterns of fibre-cleaners made, that are in general use by the natives of the Philippine Islands for cleaning Manilla hemp. The essential parts of these fibre-cleaners can be made at a cost not exceeding R3. The fibre can also be extracted by scraping the 1¾"—wide strips, with a blunt knife or piece of bamboo, on a hard, smooth board or plank, with some arrangement for a dribbling supply of water to fall on the fibre while it is being cleaned.

It may be appropriately mentioned here that one of these fibre-cleaners was supplied, gratis, in July 1900, to the Superintendent of Coimbatore Jail, at the request of Lieutenant-Colonel O'Hara, I. M. S., Inspector-General of Prisons, who had one of the Coimbatore Jail wardens sent to Ootacamund to be shown the method of extracting fibre by means of one of these simple machines. It is understood that the Inspector-General of Prisons has directed experiments in cleaning plantain-fibre to be carried out in his department.

It, however, requires a considerable amount of practice before a man becomes expert at the work of cleaning plantain-fibre with one of these simple machines. Besides this, it is well understood that the conservative traditions, suspicions and prejudices of the people are by no means easy to overcome when any attempt is made to introduce among them (although it may be intended for their ultimate benefit) the knowledge of any useful art from another part of the world

Demonstrations in cleaning both the *Musa textilis*, and the common plantain-fibre with these primitive, but very effective, machines were given to natives at Ootacamund, at Sim's Park, Coonoor, at Burliyar, and also at Kulyar, with a view to making them practically acquainted with the fibre, which they, one and all, confessed they were previously unaware of. Among them were persons from such places as Mettupalaiyam, Coimbatore, Palghat, Nilambur, Trichinopoly, Krishnagiri and Mysore province

When an ordinary plantain stem* has borne a bunch of fruit, it is cut down and ususally thrown away by the owner or by his servant. Taking the aggregate of the plantain stems in this Presidency alone that are cut down annually and thrown away, the waste of fibre, which might be put to some use, must be enormous. If therefore, the ryots could be induced to clean and to make use of the fibre locally, perhaps an export trade in it, and also in Manilla hemp, might be created in course of time.

In the Dictionary of Economic Products of India, volume V, pages 296—307, will be found a great deal of valuable information regarding "Manilla hemp" and other plantain-fibres, and of the many, mostly unsuccessful, efforts that have already been made to establish an industry in them in India.

The best camphor plant among those that were planted on the 1st December 1899 was 7ft. 9in in height on the 22nd March 1901. The species (*Cinnamomum Camphora*, Nees and Eberm.) which furnishes the Formosan Camphor of commerce and which is now fetching very high prices, will grow in India at sea level *e.g.*, the short avenue in the Royal Botanic Gardens, Sibpur, near Calcutta, as well as at high elevations in Southern India, *e.g.*, the trees in the Botanic Gardens, Ootacamund, 7,400 feet elevation. It will, therefere, be seen that the tree will grow successfully under a very wide range of conditions as to temperature.

The Para rubber trees (*Hevea brasiliensis*, Muell. Arg.) whice were planted in November 1898, are growing rapidly. The tallest tree was measured on the 22nd March 1901; it was 18'-8" in height and had a girth of 7½ inches at one foot above the ground. This species yields the most valuable kind of rubber hitherto discovered.

The Central American rubber trees (*Castilloa elastica* ?), which were planted in September 1898, are doing well. The tallest tree, measured on the 22nd March 1901, was found to be 12 feet in height, and the stem was 14 inches in circumference at one foot from the ground.

Of the plants of *Kickxia Africana* ? (one of the most valuable species of West African rubber trees) that were planted in December 1899, the best tree was found to be 8'-10" in height on the 22nd March 1901. This may be considered as very satisfactory growth.

The Ceara Rubber—*Manihot Glaziovii*, Muell. Arg. —Much attention was given to this species during the year at Kullyar, at Burliyar, and also at Nellacotta and at Pandalur in the Wynaad. It may be mentioned here that the practical study of this rubber tree has been carried on by the Curator for several years now as opportunities occurred, but chiefly in the intervals between his official duties.

One of the main outcomes of these observations is that trees of the same age and size have been found to differ from one another remarkably in their yield of rubber. A large tree, girthing 3'-10" at four feet from the ground, was tapped at Pundalur in February 1901, and it yielded only about a tea-spoonful of latex. This tree was cut down and brought to Ootacamund as a specimen of a perfectly useless ceara rubber-yielding tree. On the other hand, a few good rubber-yielding trees have been met with and noted at Kullyar, at Nellacotta and at Pundalur. Cuttings of one of the best rubber-yielding trees at Kullyar were taken and planted in Burliyar in January 1900; and a few of the plants raised from them are now over 14 feet in height.

In February 1901 cuttings were taken from the best latex-yielding tree at Nellacotta, and also from the best tree at Pundalur, and have been placed in one of the glass houses in the Ootacamund garden in order to get them to grow. Later on, it is intended to plant them out at Burliyar or elsewhere, with the object of testing them, and to propagate them if they are found to be as good rubber-yielders as the parent trees.

What has been accomplished by the Dutch in Java in connection with the selection, propagation and

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* The word "stem" is used here for the sake of simplicity. Botanically, the so-called stem of the plantain is not a stem at all, but is really composed of the broad laterally-curved leaf stalks compactly folded over each other to from a support (which serves the purposes of a stem) for the blades of the leaves,

improvement of cinchona trees, which now yield surprisingly high percentages of alkaloids, and also by the Vilmorins of Paris in connection with the production of new varieties of the sugar beet-root which yield high percentages of sugar, might also be done in connection with rubber trees with probably equally encouraging results in course of time.

It will be observed that only a small beginning has been made to discover the best rubber-yielding tree or trees in each of the plantations named, and to propagate them by cuttings. This should, however, also be done in the case of all plantations or groups of the trees in the district or even beyond it. The yield of latex by the progeny of the best trees, planted in order in one garden, would, in turn, have to be compared; and by working on the lines of intentive selection, propagation and cultivation of only the very best latex-yielding trees it is reasonable to hope that, in course of time, a variety of the tree yielding a really paying percentage of rubber may be evolved.

These principles will no doubt also apply to all other species of rubber-yielding trees.

51. For the sake of convenience it may here be mentioned that, in February 1901, the Curator tapped a tree of *Plumeria acutifolia*, *Poiret*, at Gadbrook, Nellacotta, Wynaad, and obtained a small cake of rubber from it. A report on the quality and value of this rubber will be obtained in due course.

CEYLON EXHIBITS IN THE BREMEN MUSEUM.

The *Weser Zeitung* has a full notice of the additions recently introduced into the Museum of the great trading centre, Bremen, from Ceylon. This journal writes: "The products from this pearl of the British Colonial possessions are almost all beautiful samples, well laid out; especially noteworthy are the tea, spices, cinnamon, pepper, vanilla, cardamoms and the products of the coconut; there is also a fine collection of specimens of graphite and mica. The trade of Ceylon with Germany, though small, is increasing. In shipping intercourse Germany stands second. In the year 1899 only 132 German ships entered the Colombo harbour with a tonnage of 336,530 tons; but with the duplicating of the East Asian Postal line and further extensions of freight lines to Hamburg the rate must have been greatly increased. Germany's export to Ceylon was in 1898 1·7 million rupees, in 1899 2 million rupees, while the imports from Ceylon rose in the same time from 3·8 million to 4·75 million. Tea occupies the first place among the exports of Ceylon...[Then follow figures to show how tea has taken the place of coffee....Tea production has increased so rapidly that just now over-production is feared, especially of the lower grades. Already many methods have been tried to bring down excessive production...the 10 p.c. limit, &c. Tea cultivation is carried on, increasingly, on scientific principles, with the assistance of English and other European chemists. Manures scientifically selected are largely imported into the island.

"But the cultivation of cacao, bark (cinchona) and cinnamon have all gone back, of the latter large quantities still go to Germany. If we include the chips used for the extract of oil, a larger quantity goes to Germany than even to England....The products of the coconut palm have greatly risen in importance for exports, *i.e.* coir fibre, oil, poonac, copra, &c...In the year 1900 443,959 cwt. coconut oil were exported and 362,467 copra, the latter mostly to Russia. Poonac is largely sent to Germany where it is used as fodder."......[Fibres and kitul fibre are then enlarged on]...Also precious stones and talc, from which latter lamp glasses, cylinders and shields are now made.

VENEZUELA PEARL FISHERIES.

The United States Consul at Maracaibo, in a recent report, says the principal pearl beds are at El Tirana, north-east, and Macanao, north-west, of Margarita. About 2,000 men find constant employment in this trade. The fishers use meal scoops which are dragged over the oyster beds, and when filled are brought to the surface, where the shells are opened and carefully examined. The pearls are very fine in quality, beautiful in lustre, and run from white to yellow; occasionally a black one, priceless in value, is brought to the surface. One white pearl of large size and good quality was recently sold in Margarita for £354. The value of pearls found near Margarita is estimated at about £180,000 per year. Most of these pearls go to the Paris market, which sellers claim to be best.—*Globe*, Aug. 9.

QUALITY OF CARDAMOMS.

Messrs. R C Cowley and J P Calford have made investigations into the quality of cardamoms and have aimed at the following results:—

	Malabar.	Mysore.	Mangalore.
Number of fruits in 10 gmes ..	80	55	45
Percentage proportion of pericarp ..	30	25	20
Percentage proportion of seed	70 { dark 57, light 13 }		80
Percentage of ash from dark seed ..	5	3·3	2·9
Percentage of ash from light seed ..	8·5 to 9	4·5	—
Percentage of ash from pericarp	13	7·1	7·6

They say that lime predominated in the pericarps of all varieties to such an extent that an admixture of twenty per cent of pericarp with seed would be readily distinguished by precipitation as oxalate from acetic acid solution of ash. Two-thirds the ash of Malabar pericarps is soluble in acetic acid, but of the seed ash less than one-half is soluble, and this portion is mainly potassium salts. Manganese and iron are present in all varieties, but in Mysores the proportion is very small. Cobalt was not found. It is suggested that the yield of volatile oil might be a useful test. (1) They conclude that an ash determination of the seed is *per se* of questionable value as an index of quality. (2) The mineral constituents are not constant. (3) The large proportion of lime in pericarps is characteristic of all varieties. 4 The ash percentage of light-coloured seed is always higher than that of dark because of the imperfect development of matter. The reference to lime is somewhat astonishing in the face of the general deficiency of this ingredient in South Indian soils.—*Planting Opinion*, August 24.

PRODUCE, PLANTING AND COMMERCIAL NOTES.

A paragraph has appeared in some of the papers here to the effect that Mr. Wilson, United states Secretary of Agriculture, has stated that the United States "will soon be able to produce all the tea she needs. Last year the department sent tea plants to every Gulf State for experimental purposes. At Summerville, South Carolina, the two tons grown there last year so satisfied the New York investors that they immediately formed a syndicate and bought 6,000 acres to devote to tea cultivation." Those tea experts who know the flavour of this home-grown tea are less sanguine than Mr. Wilson about the success of American tea—at any rate, this side of eight or ten years. No doubt if the duty on tea is maintained the American tea industry, thus protected, will some day assume proportion, but this is all the more reason why Indian and Ceylon planters should capture as much of the American market as they can, and endeavour to stick to and develop it as promptly as possible. It is well worth a strong effort.—*Home and Colonial Mail*, Aug. 9.

THE TEAPOT IN INDIA.

By Sir Edwin Arnold.

(*Daily Telegraph*, Aug. 3rd.)

In a recent speech upon the Assam labour question Lord Curzon made a suggestion which may prove to be the beginning of a new social era in India. Full of ideas as is the accomplished Viceroy, I am inclined to think that the most brilliant and fruitful of them all was set on foot when his Excellency asked why India could not be induced to drink her own tea. Why not, indeed? we may well inquire. It is known that she grows the best tea in the world, and Assam, indeed, is the original mother-country of the little bush which has become so famous and necessary. Yet, as a matter of fact, hardly an ounce of tea, black or green, is consumed by Indian natives; it is still as strange and foreign to them as it was to Mr Pepys when, on Sept. 28, 1660, he wrote in his diary: "I did send for a cup of tea, a China drink, of which I had never drank before." That was the beginning of the "cup that cheers" in England, and it was about the same time when the chairman of the East India Company, writing to Calcutta, added the famous postscript to his letter, "Tell our agent to buy and send hither six pounds of the best tay he can gette." And now what a business it is! India and Ceylon between them do an enormous trade, which has quite outpaced the tea-gardens of China, and could and will be greatly extended. Japan and the Celestial Empire are her principal rivals; but Japan drinks a great deal of her own and sends all the surplus to the United States, the world in general, which in this case really means Russia, America and England, being supplied, the first-named entirely from China and the others from the general market. Now it would be an excellent thing if India would take to the drinking of tea. That it may become

A UNIVERSAL AND POPULAR BEVERAGE

is proved by Japan, where, taken without milk or sugar, its use is constant and pervading. Many other nations have special drinks. The South American takes his "maté"; the African his "pombe"; the Polynesian "kava," and so on. But the Hindoo has always been contented with simpler water. I hardly know of any other potable among them except the liquid in which rice has been boiled, which they call "conjee," and sometimes, perhaps, milk and water, with a little spice in it. The Hindoo housewife does not make stews nor soups—forbidden these things by her creed—and very rarely does she provide anything like a vegetable broth. Most of the household food, such as chupattis, grain, &c., is cooked on sheets of iron, the saucepan coming very little into the domestic cuisine. The Hindoo housewife knows nothing of cocoa or chocolate, and has never even tasted that coffee of which her Mohammedan sister partakes. But what an excellent thing it would be if Lord Curzon's idea should make her a tea-drinker! Taken as the Japanese take it, pure and simple, without cumbrous paraphernalia, tea-drinking would well suit the population. First of all it would, as in Japan and China, lead to the general habit of boiling all the drinking-water. That one custom would save lives by hundreds of thousands, for the peasants, once habituated, would take cold tea with them to the fields, and avoid for themselves and their children the terrible evils of the village tank. Next, tea, though only slightly nourishing, prevents waste of tissue, and helps food to assimilate; so that the trifle spent in a cheap but good leaf would be well repaid. Thirdly, it is a social cup, conducing to conversation and family peace, and would be a great boon to the patient, gentle womanfolk who have such few pleasures.

Of course, there must be no question of five o'clock fashions and elaborate tea equipages. A kettle, a teapot, and some cups should comprise all the machinery necessary. Milk and sugar are innovations introduced by the West; and spoons, plates, and cream-jugs are not in popular knowledge. Every morning the Hindoo household sends forth a mother, an aunt, or a sister to the village-well, where the chatty of copper, brass, or baked clay is filled to the brim, corked with a tuft of convolvulus or lemon-grass, and carried back to the hut for the day's consumption. The cooking stove is a hole in the ground with a few stones, the fuel charcoal or cow-dung cakes. Everything is primitive, and will remain so. Yet, if once Lord Curzon's good idea should strike root into the soil, I hardly know what boon could prove greater than tea-drinking established as

A HABIT AMONG THE HINDOOS.

Beside the countless lives saved by boiling the water, the homes made pleasant by the little social graces which cluster round the tea-pot, and the pride and comfort of a little luxury embellishing daily life, it would be a stupendous lift for the tea industry of the land. Accordingly the Viceroy's suggestion has been intelligently taken up. An official crusade for the propagation of the tea-kettle has actually been started. We learn from a high Indian authority: 'A tea distributing agency has been formed, and Messrs. Andrew Yule & Co., have undertaken the work of distribution for three years without remuneration except out-of-pocket expenses. The Tea Association has given, a grant of 40,000 rupees. The large agency houses (headed by Messrs. Finlay, Messrs. Muir, Messrs. Yule, Messrs. MacNeill, Messrs. Octavius Steel and others, have agreed to contribute three-quarters of a million pounds of tea annually. With the present low prices, the native consumption is expected to reach 15,000,000 or 20,000,000 pounds. If this is achieved, nothing more is likely to be heard of over-

production. Special efforts will be made to cultivate a taste for tea-drinking among the native passengers on the railways, who exceed 160,000,000 annually. An average consumption of one ounce would give 10,000,000 pounds consumed in a year on the railways alone, without counting the consumption of the general population."

Mark how splendid is the outlook of all this! Talk of storms in a teacup; here is promise and potency of golden profits for the planters, enhanced revenue for the Government, and health and pleasure for a population of 250,000,000,

ALL ENSHRINED IN A TEA-CHEST

If the notion took root, Assam and Cachar might safely double their tea-gardens; the Indian potters might make a little fortune in each district by turning out such utensils as native taste would demand, and although sobriety is a virtue which few Hindoos have to learn, the use of tea is everywhere seen, and above all in Japan, to be the greatest friend of temperance and gentle manners. There is a whole gold-mine in the idea of supplying Indian railway travellers with hot and cold tea in place of the untempting and rather perilous water-jars now on offer at all stopping stations. Cold weak tea is probably the best and safest beverage for thirsty throats; and if Lord Curzon's suggestion led to nothing more than a growing habit of boiling drinking-water, it would be a result worth any efforts. Only too much must not be hoped for. The Hindoo is beyond all men cautious, conservative, and caste-ridden. The tea he uses would have to be specially grown, prepared, and guaranteed, and the Brahmans and higher classes must first be won to the teapot. Perhaps something classical might be found in the scrolls of Hindoo mythology which would sanctify and recommend the tea-leaf, as has happened in the case of the sweet basil. In front of almost every Hindoo door will be seen a square earthenware pot marked with rude figures in coloured chalk, and containing a dwarf shrub. This is the holy Tulsi—the plant consecrated to the protecting deity; and the Indian housewife would as soon forget to grind the day's grain in the little stone-mill as to pour the morning water over the Tulsi-plant on her doorstep. My good friend,

SIR MOUNTSTUART GRANT-DUFF,

who, like King Solomon, knows the Eastern flora from the cedar to the hyssop, could find, I am sure, something charming and authoritative about that plant which, indigenous in Assam, has borrowed its name of "Tcha" from China, and is least of all known in the land where it grows best and most naturally. If, then, Lord Curzon can teach India to drink tea he would, in my judgment, deserve for ever to rank among her greatest benefactors, and it is a policy which I am sure all Englishwomen will appreciate and support.

TOBACCO AND COFFEE PLANTING IN DELI, SUMATRA.

From an old Ceylon planter.)

O. K. Sumatra Aug. 11.

For *two years* it has been a hard struggle; beef $1 per lb. and heavy Dutch import duties on all goods. It has been all I can do to cover current expenditure. There is a cruel inequality in this world. Here am I slaving away on what might almost be called sweating wages, in coffee; and about four hours' distance is a man, in *tobacco*, whose *commission* last year is stated to be 240,000 guilders. Don't mistake it: *Two hundred and forty thousand guilders* at 1s 8d=£20,000, twenty thousand golden sovereigns as one man's commission on profits for one year's working. This may be exaggerated: but not by very much, I believe. At any rate, though this be the highest perhaps ever won, £10,000, ten thousand pounds, is not an uncommon sum for a tobacco manager to pocket as his commission on a year's working.

I know very little of

TOBACCO;

and just now, my chief being in Europe, I am tied hand and foot. Next year I shall have more freedom and will try and move about and get some tobacco figures for you.

As for

CACAO,

with ideal soil and ideal climate, nobody will look at it here.

Last year Von Roll, managing Director of the premier coffee Company in this district, went home and I gave him a letter to you—but homeward his ship called on Sunday, and outward at night, so he had no chance of seeing you. To Baumann also I gave a letter. His steamer also called on a Sunday!

We are just now picking two crops here,

COFFEE AND CATERPILLARS.

We have the same pest that Selangor suffered from two or three years ago, but I am not nervous about it, as I think we have taken it in time. One estate was eaten to besoms before any one knew that caterpillars were in the district; but this gave the alarm, and no ragged bushes are to be seen.

"A NEW FODDER GRASS FOR INDIA.'

is the title of a paper filling the first number for 1901 of Dr. Watt's "Agricultural Ledger," dealing with "Paspalum dilatatum." Much of the information given refers to Australian reports and very little experience so far has been got in India. Knowing the great interest Mr. Nock of Hakgalla takes in "fodder grasses," we sent him the paper in the "Ledger" for his opinion and he has been good enough to write as follows:—

"I notice Dr. Watt states on page 3 that 'this grass is indigenous to Ceylon,' which, I think, is a mistake, as I never met with it wild and it is not mentioned under *Paspalum* in Trimen's 'Flora of Ceylon.' Baron Ferd. von Mueller (p. 1) gives 'Extra Tropical South America' as its native habitat. I am afraid I cannot say very much about it yet. I have it growing here, also in Nuwara Eliya and Badulla. In Nuwara Eliya in good soil it is growing very well and is particularly robust, but its habit is nothing like what is described in Dr. Watt's paper, the longest blades in Nuwara Eliya being not more than 12-14 inches, instead of 5 feet. Probably this is on account of the cold. It has, however, taken firm hold of the soil and bids fair to become a valuable addition to the few good fodder plants of the locality. A small bed of it at Hakgala is looking very healthy and promises to do well, although it is too young (6

months old) to be sure about it. Another small bed in the Badulla gardens has made a very good start, but was only about 3 months old when I saw it last and it was then 9 inches high."

COCONUTS IN DEMAND.

Coconut cultivation has been rapidly extending in these parts through European and native enterprise during the last fifty years; but instead of the apprehension of over-production which, like a hobgoblin, now haunts the pillows and disturbs the slumbers of the Tea-planter, the local coconut planter is cheered by the bright prospect of steadily increasing prices for his produce for which the demand is in excess of the supply. Coconut timber, nuts, oil, copperah, fibre, in fact, the varions produce of the palm, fetch very good prices. Coconuts are at present very dear and the demand for them will be greater when the railway begins to run.—*Cor. Jaffna, Catholic Guardian*, Aug. 31.

TOBACCO AND OTHER CULTIVATION IN NORTH-CENTRAL CEYLON—AND IN BORNEO.

Mr. W. D. Gibbon writes :—

"I note your footnote to my news from Borneo. 'God help the man' who tries to plant tobacco of the sort that Borneo and Sumatra supply, in the North-Central Province. You seem to forget the melancholy failure made by the Sumatra planters who certainly knew how to grow in Kurunegala the sort of leaf wanted; but whose undertaking was such a ghastly failure.

A JAPANESE TEA COMMISSIONER STARTING FOR FRANCE.

The late Paris Exposition of 1901 has unexpectedly had a good effect upon our tea trade. Since the close of the exposition, during which display our tea house opened there enjoyed universal favour, the Central Tea Guild in the Capital, by which corporation the above tea house was opened in the Exposition grounds, has received many orders either officially or privately from varions establishmeuts and individuals in France for the shipment of the Japanese leaves; our honorary Consul in Marseilles having likewise been asked by some French merchants for recommendation to a respectable Japanese establishment for the opening of transactions in the tea business. Such being the case, the Tea Guild will despatch Mr. Kisaburo Sano to France for the purpose of arranging contracts with the French establishments in connection with orders received and the gentleman is expected to set out on his mission on the 10th instant, taking with him a variety of samples consisting of 500 kilo. of leaves from the Kobe Seicha Kaisha, 300 kilo. from the Yokohama Seicha Kaisha, 100 kilo. each from the Chuo Kaigisho, the Formosa, Chasho Kokai, etc. It is said that, in case the contracts will be arranged between the French establishments and the commissioner above referred to, our tea shall hereafter be shipped directly to France from various tea establishments both in Formosa and Japan proper.—*Japan Weekly Times*, Aug. 10.

TEA IN AUSTRALIA.

"The Story of the Tea Trade" is the title of an attractively written and illustrated pamphlet issued by the well-known Indo-Ceylon Tea Firm, James Inglis & Co. of Sydney, the founder of which has done so much to popularise British-grown teas in the Australian Colonies. Charming pictures are given of both Indian and Ceylon tea plantations and of all the processes from the clearing of land to the shipping of tea boxes. The following page is worth reproducing :—

The Melbourne International Exhibition of 1880-81 was inaugurated with much pomp and ceremony in the Victorian capital. Mr. Inglis, under Sir Edward Buck, K.C.S.I., Chief Commissioner for the Indian Empire, was again put in charge of the Indian Court and Exhibits, as Executive Commissioner. Special attention was, of course, paid to the exploitation of the Indian Tea industry. A dear old colleague of the writer—the late A. M. Ferguson, C.M.G., proprietor of *The Ceylon Observer*, and Executive Commissioner for Ceylon—proved a willing and able co-worker with Mr. Inglis, in the effort to exclude impure and objectionable China Teas from the Australian market, and substitute therefor, the pure, strong, and flavoury growths of India and Ceylon. It was a "hard row to hoe." Vested interests were strong. The China traders and importers had long "ruled the roost," but the twin colonies in Her Majesty's Indian Empire, had a "good cock to fight," and they fought it for all it was worth. In the Press and on the platform, white-heated controversy raged. Mr. Inglis was in the thick of the fight. He wrote pamphlets; he lectured; he wrote to the Press, and in both the Indian and Ceylon Courts, beautifully furnished Tea kiosks or lounge rooms were fitted up, wherein Tea was dispensed; and so by "here a little and there a little," the undoubted merits of the Indo-British-grown Teas forced their acceptance far and wide, and the following table, kindly compiled for us by Mr. Dyer, of Alfred Harvey and Co., shows at a glance how the fortunes of the fight have gone. In 1880-1, the total recorded imports of Indian and Ceylon Teas to all Australia, were less than 100 lb. of either. Leaving the intermediate early years out of the record, a glance at this table will, we think, somewhat astonish you.

Shipments of Tea to Australia since 1888.

Year. 1st May to 30th April.	China, lb.	Indian. lb.	Ceylon. lb.
1888-89 ..	24,118,451	2,880,596	846,104
1889-90 ..	21,050,332	3,600,000	1,533,440
1890-91 ..	15,378,142	4,716,827	2,814,713
1891-92 ..	13,875,993	5,139,523	3,541,618
1892-93 ..	14,898,258	3,845,328	5,694,729
1893-94 ..	13,986,445	6,514,356	7,650,000
1894-95 ..	10,463,585	8,000,000	4,452,214
1895-96 ..	11,262,500	11,102,506	6,818,503
1896-97 ..	6,756,656	12,862,701	6,267,000
1897-98 ..	4,593,000	6,596,728	13,837,604
1898-99 ..	5,737,063	6,248,811	15,899,389
1899-1900..	6,517,406	8,301,839	15,349,144

See the enormous shrinkage in China Teas. Even now Indian imports exceed those from China, and the Ceylon shipments about equal both combined.

Quinine in Corea.—Our Consul at Corea says that the importation of quinine, to which reference was made in the trade Report for 1898, continues to be an item of some importance in the import trade. During 1900 the quantity imported was 120 cases of 100 1-oz. bottles each, representing a value of about £8,000. The business is in the hands of a German firm.—*British and Colonial Druggist*, Aug. 23.

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop, August-September delivery 1901 ; booking necessary before the end of April ; quantities of 100,000 and over at special low rates. Plants available all the year round. 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year."

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery, 1901, booking necessary before the end of March ; large quantities on special terms ; Plants in Wardian cases.

Manihot Glaziovii —Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter, in sending an order for this seed, wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Kickxia Elastica.—(*Funtumia Elastica*).—Seeds and Plants, orders booked. (Lagos rubber.)

Ficus Elastica.—Seeds available in May-June ; booking necessary before the end of March ; also plants.

Urceola Esculenta and **U. Elastica.**—Same as above. (Burma rubber.)

Parameria Glandulifera.—Orders booked for seeds for January-February delivery ; also plants; immediate booking necessary. (A good rubber creeper of Malacca.)

Landolphia Kirkii.—Seeds in July-August, early booking necessary. Plants can be supplied all the year round. (A highly-recommended species.)

Chonemorpha Macrophylla.—Seeds and Plants ; orders booked. (A very valuable rubber-yielding creeper.)

Mimusops Globosa and **Payena Leerii.**—Seeds and plants in July-August, booking necessary before April.

Achras Sapota, Willughbeia Firma, W. Edulis and other **Rubber and Gutta Percha** yielding Trees and Creepers, Seeds and Plants.

Cinnamomum Zeylanicum (Cinnamon superior variety). New crop of seed in April to June, booking necessary before the end of February ; also plants.

Coffea Arabica, Liberian Hybrid and **Maragogipe Hybrid.**—New crop March-April ; immediate booking necessary.

Cinchona Ledgeriana.—Seeds now ready, also other varieties.

Seeds and Plants of Nutmeg, Clove, Sandalwood (white and red), Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products of Foreign countries for 1901-1902, now being prepared, and will be ready in a few months.

"SOUTH AFRICA."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by WILLIAM BROTHERS, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbing. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Price List of Seeds and Plants for CEYLON use, post free, on application.

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants ; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns. Crotons, Orchids, Bulbs, Dracænas, now being prepared, and will be ready shortly.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—MESSRS. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address:
WILLIAM, VEYANGODA, CEYLON.
Lieber's, A.I. and A.B.C. Codes used.

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
HENARATGODA, CEYLON.

Correspondence.

To the Editor.

CACAO-GROWING IN THE SOUTH PACIFIC ISLANDS.

22 CWT. CACAO PER ACRE IN SAMOA !

Apia, Samoa, May 21st, 1901.

SIR—In your issue of March 1st this year and on page, 615 is an article styled "Cacao : Pollination and 10 cwt. to the acre."

I regret to say that none of us in Samoa have sufficiently follwed your valuable Journal to understand propely what the term "Pollination" means. We suppose it means that the pollen from the male flowers is to be introduced into the female flowers by hand, in a manner somewhat similar to that employed in fertilising Vanilla. Would you be so kind as to explain the term to us ? [Yes: to apply pollen to a stigma.—ED. *T.A.*]

The culture of cacao has but begun in these islands and less than 500 acres are now planted. Within the next six months we look to get in an additional 200 acres and such arrangements are being made that we believe a very large area will be set out in 1902, probably over 1,000 acres for that year.

Next year about 150 acres will be in full bearing—that is lands cultivated by foreigners. It is also likely that an additional 100 acres of native cultivation may also be in good bearing as well. As we are cultivating cacao quite differently from the manner stated in "Pods'" article, I have thought it might be of some interest to recount for you our experiences, and the results so far obtained.

Mr "Pod" speaks of cultivating trees so close that 300 may be set out on a single acre. And he fears that the Ceylon soil will not stand such a drain as 5 cwt. of cacao per acre per annum. And he calculates that 15,000 pods will produce about 5 cwt. of cacao—about 30 pods to the lb. In Samoa we are planting our trees spaced so that we get from 120 to 150 trees to the acre, and some people think this too close. Last year they averaged 6 lb per tree of cured merchantable cacao of the highest quality, and this year's first crop has already averaged close upon 6 lb per tree, so that, with the October crop yet to come, it is pretty safe to say we will get from 8 to 10 lb cacao per tree. Mr. "Pod" seems to be well satisfied with a yield of from 2½ to 3 cwt per acre, per annum, but thinks that pollination may double this yield. We are not resorting to this expedient here to get still more favourable results.

We have both the Criollo and the Forastero varieties, and their crosses, in all our fields and all thrive equally well. So far we have had no disease or pest to fight, and we hope we may escape such difficulties. Manuring is not thought of yet, but in time we may have to resort to it, though we see no present signs of so doing.

As this enterprise is of a comparatively recent date in Samoa—the life of the cacao tree in these slands is as yet undetermined ; but with our trees spaced 18 feet apart, we think they should last reasonably well. When the seasons have been particularly dry, we have noticed that a good few pods turn black just before maturing. No one here has been able to account for this. This year we have had showers quite constantly and the percentage of black pods is very low. Some have said that our trees were not able to mature so many pods as were being produced, and nature, in order to relieve the tree, destroyed in this way a part of the produce. Possibly in Ceylon the same phenomenon has been observed and most likely you can tell us its cause; maybe you can also name its cure. [Is it not evident that drought in Samoa is to blame ?—ED. *T.A.*]

I have seen very many trees this year with from 150 to 200 well-matured cacao pods on them *for the April crop*—and it is to be noted that the tree will keep right along, bearing slowly till October—when another sizable crop will be harvested, probably about one half as large as that produced in April.

On a tree just four years old, within a mile and a half of Apia, I have this April personally counted 270 fine well-matured cacao pods, and the cacao from this orchard, being cured, distinctly showed that 16 pods were sufficient to make a pound of merchantable cocoa.

We have here cacao trees but two years and five months old which are now full of young cacao pods, but it is my belief that, although many cacao trees will bear soon after they are three years old, a paying crop cannot be counted on until the fourth year.

As to the price we have had for our cocoa I may say that, though the buyers have found some fault with our methods of curing it, still what we have sent away has brought, in San Francisco, from 16 to 18 cts. per lb. and the bulk of it, which has gone to Hamburg, has realized of late 93/6 per cwt., with the promise of a better price as soon as we could deliver in quantities sufficiently large to induce the manufacturer to make up our variety of cacao by itself. Mixed with other cocoas it loses its identity.

We see no reason to apprehend that the price will fall—in fact all of our information leads us to believe we may even get more before long. We cultivate either variety indifferently. If one raises the Forastero cacao he gets larger pods, but not so many as if he attempted the Criollo. There is no difference in the cost of cultivation and little in the gathering and curing.

If we are raising from 8 to 11 cwt. here in Samoa per acre against your 2½ and 3 cwt. in Ceylon, the conditions here must be infinitely better than with you.

I may say that very many people believe we have here the most perfect cacao conditions in the whole world. Others say that "Mr Pod" is surely underestimating the usual yield in Ceylon. Will you, Mr Editor, kindly inform us which opinion is right? [Samoa has undoubtedly far richer soil than Ceylon.—ED. *T.A.*]

The Cacao outlook has been such as to attract a great deal of notice here in Samoa, and nearly every storekeeper, and trader, is getting into it for all he is worth.

Previous to the discovery of our capacity for production, lands back from the sea—no matter how good—were almost unsaleable.

Four years ago, 3000 acres, almost adjoining Apia, were sold to the French Catholic Mission for $2 per acre U. S. gold.

Similar land farther away was sold during the early part of this year for from $2.50 to $4 per acre. Just now this land could be easily resold at

from $6 to $20, and to my mind is still remarkably low. We have here to pay our labourers much more than you pay to your coolies, but we expect, I think, more work out of them.

Just now we are paying $8 per month and feeding the people at a cost of $4 more per man:—$12 in all. You will please understand that we are up till now using English money, and that we reckon 4 shillings to the dollar, and therefore our dollars are about twice as expensive as those mostly in the East Indies. [Rupees in East Indies at 1s 4d each, and 10 rupees a month is high for a working coolie.—ED. *T.A.*]

Still with the high rate we are paying we expect to make profits up to, and in fact much past, 20 pounds sterling per acre, per annum, after our Cacao trees are past their fourth year.

All of our land is covered with dense forest which has to be cleared out, and this expense runs into about 8 or 10 pounds per acre, including seed and planting. Some retain part of the forest for shade and so get their land in cheaper. I am using both methods myself and cannot yet say which I prefer. All readers of your esteemed Journal who reside here will be glad if you will kindly comment upon these statements and if you will answer the few questions propounded.

The British Consul at Apia is well versed in the culture of Cacao as practised here—and he will cheerfully corroborate any of the above statements I have made. H. J. MOORS.

Apia, July 6th 1901.—Somehow the above letter, dated away back in May, has remained here unsent. Since it was written we have got our April cacao cured and away before this. On the 4th inst. at the usual jollification held at the U S Consulate, Mr R H Carruthers of this place announced that his cacao for the earlier part of the year had turned out 17 cwt. to the acre. Now there is no more reliable man in the world that this gentleman, an accomplished British Barrister.

The October crop is yet to come and I make no sort of doubt but that Mr Carruthers will be able to harvest, at the very least 5 cwt. more per acre, thus making 22 cwt. for the year for each acre. The trees are seven years old, planted 15 feet apart at an elevation of 450 feet and just two miles from the sea shore. A little breadfruit shade has been left. No disease has so far attacked any trees here: a little trouble we have had with white ants, and with a sort of fungus. Borers also in rare cases attack the tree, but do not seem to be able to kill it.

The only difficulty so far as I can see is that we have at times a number of black pods, and we do not rightly know why they get so.

The bees probably assist at the pollination in some way.

Land seems every month to enhance upon older values. Shortly, I expect, when we begin handling easy cacao moneys, there will be a little excitement over our prospects.—Very truly yours,
H. J. MOORS.

THE AMERICAN TEA CAMPAIGN:

QUESTIONS FOR THE "THIRTY COMMITTEE" AND MR. WM. MACKENZIE TO CONSIDER AND ANSWER.

Honolulu, July 17.

DEAR SIR,—Mr. Mackenzie in his report to the "Thirty Committee" dated New York March 20th, 1901 writes:—"I did not go to Chicago this time, because I met down here all the men I wished to see." What more proof can be required to show the absurdity of continuing the tea campaign in America on present lines, That the funds from the Tea Cess, spent in America, have been devoted to our Advertising Agent's chosen disciples, to the detriment of the unfortunate cess-payer, (who is anxious to see Ceylon tea throughout the length and breadth of the land, not merely confined to the few stores controlled by our Advertising Agent's chosen disciples), must be clear to those who have the privilege of reading our Advertising Agent's private reports. It is little wonder that nine-tenths of the tea merchants in the United States of America have a bitter feeling against the Ceylon Tea Planters in general, and take no interest in the sale of the teas they grow; and so long as our advertising funds are restricted to the chosen friends of our Advertising Agent they are not likely to change. No doubt our Advertising Agent will cry poverty, but then why does he continue to pay a third of the advertising? If funds are limited, and over applied for in the United States on the one-third basis, why not offer to pay a fourth, and so on from time to time, reducing the assistance as firms come forward.

Mr. Mackenzie has been working the tea campaign in America for about seven years; it would be very interesting to those who perforce have to contribute to the Cess fund to know how many cities in the United States and Canada Mr. Mackenzie has visited during the seven years? If, during the seven years, he has ever visited the Western States, or any cities in the West of Canada?—which I have been informed he has not. How many firms he has honored with a call, (I don't think that would be a difficult matter), and last but not the least important, how many months—during the seven years he has been our paid Advertising Agent for America—has he resided in that country?

R. V. WEBSTER.

A NEW SCHEME FOR REDUCING THE OUTPUT AND OVERPRODUCTION OF TEA:

AN INCREASED CESS TO BUY UP, AND ABANDON 50,000 ACRES OF TEA.

Central Province, Ceylon, August 26th, 1901.

SIR,—Four schemes have now been put before tea producers which the authors believed would save the large number of growers of low quality teas from ruin and make the more fortunate owners of estates which produce the better quality teas more certain of being able to continue to secure the handsome profits they have secured till lately. Two of these schemes (Mr A Cooke's, and Mr A Thomson's brought forward in London) are based on the regulation of the sale of the tea produced in India and Ceylon and do not depend on the reduction of the output. The regulation of the sale of tea would no doubt benefit producers; but considering the large over-production of last year and the heavy stocks of Indian and Ceylon Tea at the beginning of this year it seems to me that the reduction of the output is of far greater importance than the regulation of the sale. One

of the schemes for reducing the output, the Rutherford-Rosling, has fallen through. It would have done good if it could have been carried out; but it was impracticable. The other, Mr James Sinclair's would be a sure way of reducing the output, but it will probably come to nothing from the same course (want of unanimity) as the Rutherford-Rosling scheme, produced to some extent by the difficulty of finding work for the coolies during the month, the tea bushes are to be left unplucked and from a considerable minority of producers not being willing to adopt it because they think it unnecessary.

I venture to put forward a scheme, which, if brought into operation will reduce the output and can afterwards be made to regulate it. I propose that Government be asked to raise the Tea Cess to 2 or 2½ cents per lb. and to advance, if required, any reasonable amount on the security of the Tea Cess. The excess of the increased Tea Cess over the present Cess to form a Fund to be used by a Sub-Committee of the "Thirty Committee" to buy estates which may be in the market or offered at a low rate per acre, to the extent of 50,000 acres of tea in cultivation. These estates to be abandoned with the exception of a small part of each sufficient to give employment to a small gang of coolies to be kept to guard the buildings, machinery, furniture, &c. A large staff consisting of an experienced Inspector and Valuator, a number of itinerating superintendents and a native overseer (Conductor or Kanakkapulle) on each estate will be required. If 50,000 acres of tea could be bought at once and 45,000 be left unplucked, there can be no doubt whatever that the price of tea would go up. It would not be desirable that the price should be forced up too much, that could be prevented by taking a larger part of some of the better of the purchased estates into plucking again and if deemed desirable some of the poorer estates could be totally abandoned and the moveables sold. The Cess would be levied from the producers, but consumers would actually pay it, by being obliged to pay higher prices for the teas put on the market.

This, Sir, is my scheme. It is a large, daring and elaborate one. There are, I am aware, many difficulties to be overcome, but I feel confident that if it can be brought into operation it will effect all that I claim for it. B. C. C.

[There can be no harm in such a scheme as this being put on record and advanced for consideration but we fear it will be labelled "not feasible" for the present time at least. —Ed. *T.A.*]

TEA IN THE UNITED STATES AND CANADA.

(To the Editor of "The Home and Colonial Mail.")

Sir,—We have been much interested in the correspondence that has appeared in your journal on the subject of the development in the United States and Canada of a market for Indian teas, and more particularly with reference to the introduction of Indian green teas in this country, with a view to the displacement of Japan and China green teas, which form such a large part of the teas consumed in North America.

We, as brokers, handling chiefly Indian and Ceylon teas, have a personal interest in the development of this business, and it occurs to us that we might add a few remarks to what has been already said, without presumption.

We believe that it is a possibility to capture the tea-drinking population of the United States for Indian and Ceylon tea.

We believe it is also possible to increase the per capital consumption of tea in the United States by, in some measure, increasing the relative consumption of tea as against coffee, which is now the great beverage of the people of the United States. These are objects which, we understand, are ardently desired to be obtained by the tea growers of India and Ceylon.

There is, therefore, the only question of how, and how best, to obtain these ends.

We doubt not that, if the planters give the matter serious consideration, and, we are informed, they have been seriously considering it, that they will be able to collect such information as will enable them to enter on a campaign along the right lines.

We believe that all will be agreed that the plan of operation must be advertising in some form or other, and we think that the most effective form can be arrived at by conferring with those who have had most experience, as we can quite conceive of a very large amount of money being expended judiciously in advertising without realising in any adequate or compensating degree the end desired.

Happily the Indian planters can have the benefit of the experience of those who may be said to have gone before them in the struggle.

The Ceylon Association has done some excellent work, and we would suppose that community of interests between Indian and Ceylon producers is such that the knowledge and experience gained by Mr. Mackenzie, the Ceylon Commissioner, would be gladly placed at the disposal of the Indian Association. Certainly we do not look on India and Ceylon so much as competitive, as of co-operative forces in the campaign.

We think the growth of Indian and Ceylon tea business in Canada, and the means that brought this about give an experience that the planters might well consider as a proper guide in their efforts to capture the United States, and to further extend their business in Canada by the development here of a market for green tea, for in Canada we consider the work practically done as regards black tea, the importation of China black being now comparatively trifling.

There can be no doubt whatever that the advertising persistently, extensively, and continuously of some private parties here of packet teas, and the sale resulting therefrom which compelled all dealers to follow (some less willingly than others, but all of necessity), and to stock and offer for sale Indian and Ceylon tea accounts for the very general use in Canada today of Indian and Ceylon, and the relatively small use of China, and we look for the displacement of Japan tea in this country in exactly the same way by the advertising of Ceylon and Indian green teas.

We might mention this fact (which is not questioned by any well informed person here) for the encouragement of your planters, that no consumer of Japan tea, who has once got accustomed to the use of Indian and Ceylon tea, ever goes back to drinking Japan, so all progress made and every advantage gained becomes permanent.

We think the present season presents an exceptional opportunity for the activities of your planters, as Japan teas are even higher in price than last year;

while Indian and Ceylon are on a very low level, so that the natural tendency of the curtailment of consumption of a high-priced article, and the natural increase of the consumption of a low-priced article, will have a tendency to assist the efforts of the Indian Association.—We are, yours respectfully, J. L. WATT AND SCOTT.

Toronto, Canada, July 17.

—*H. and C. Mail*, August 23.

THE INDIAN TEA CESS.

August 26th.

DEAR SIR,—For many months the possibility that India would consent to a Cess has appeared almost hopeless, but in spite of the difficulties in the way, it was evident to me that Tea owners would take steps to protect their interests if sufficient endeavours were made to influence them. At the present moment the idea of a Cess on the same lines as that of Ceylon is openly discussed, and appears almost certain. I do not know how much my own endeavours have had any influence on public opinion, and at present the small Cess only is advocated, while I have persistently advocated a Cess of two pics per pound without receiving much support in "the Press."

A prominent Southern India planter advised me to draft a circular and have it printed in pamphlet form so that all the Associations could be appealed to directly. He offered R50 towards expenses, and I am arranging to carry out his advice. But I am strongly impressed with the idea that the way to get at India is through Ceylon. Ceylon men were the first to have a "Cess," and this is an Industrial departure which may have great results. Ceylon is almost certain to have a Green Tea Association before we have it in India. And if by any means Ceylon can be impressed with the necessity of a 2-pie Cess it will be passed and become a fact. Ceylon made a grand effort, and the Indian Tea owner will shortly follow in the same course. This would be within the reach of my poor comprehension if Ceylon had not passed through a crisis, and the only hope for better things seems to be that Ceylon will lead the way.

What has your Cess done for you? It has enabled you to keep pace with India, but it has not averted the crisis. Your markets are still too restricted, and do not absorb your yield at a fair price. I *cannot* understand why Tea owners will not face the situation and take measures to insure prosperity and expansion. I will put the matter before you in a nutshell:—3½ lakhs for foreign markets have failed to avert a crisis. Is it reasonable to hope that six lakhs will have any appreciable effect? Is there *any* reason to expect that 2½ lakhs more will enable our dearly beloevd Associations to increase the demand even to the extent of our natural increase from extensions already growing into maturity? Are we to be left for ever with a mere permission to make tea and reap no benefit from it? The six lakhs of the Combined Cesses will enable most of us to continue making tea, but cannot possibly enable us to make more profit. I am ready to retire from the lists, if anyone can give even a glimmer of hope that the strain will be removed if India consents to a Cess "*like that of Ceylon.*" Everyone admits that a very large sum of money is required, that tea supply must be regulated; that new markets must be fed; in fact everyone knows exactly what is wanted, but will not propose a sufficient remedy. If we had to *pay* a Cess of two pies, it would be madness to speak of it to Tea owners. If we do actually have to pay that Cess it will mean that those who make a profit *now* will get R833 per thousand maunds of tea *less* profit. And those who lose will lose *more* to that extent. Certainly this state of affairs would end the discussion by the Parliamentary method of "Closure."

I do not, for one moment, advocate *paying* a Cess of two pies a pound. What I do advocate is imposing a tax which shall be paid by the buyers and consumers, and that the amount imposed on *them* shall be of sufficient magnitude to enable us to place good average tea on new markets, so that the increased demand shall keep pace with our *certain* increase in yield. It puts my scheme in a pleasanter light, rose-coloured if you will, but to my mind the dawnlight of a new era in tea. We will force the buyers for our present markets to pay enough money to open out new markets. If any of your Ceylon men will see it in this light let them say so, and let them try and influence others. My own dreams may be too bright because of the contrast with the black darkness of the past, but your men have clear heads and the above idea should settle the matter. If they decide that the Cess has to be paid by the grower, no one would be such an idiot as to advocate a continuance of it. But if you decide that it is paid by others, the only question remaining is how much is it advisable to take from them. I propose 2 pies per pound because this sum would make practically *no* difference to the Buyers and Consumers, and it would be sufficient to lighten our markets of seventeen million pounds of tea. Mr Rosling ought to back up the scheme, because it is the outcome of his reduction scheme. His proposal was jumped at by Indian growers, but Mr Rosling forgot to make provision for the "space" which would feel the want of the reduced Tea, and he forgot the new tea growing so gaily in the sun and rain, and the jolly little estimates for extensions which we have since then seen mentioned in Company reports. He forgot that, by shutting off steam, a train going up-hill will retire backwards until it comes to its natural level. Recent proposals for a small Cess are not much better: they simply put on the breaks and keep us where we are. Had Mr Rosling *known* that owners would promise to reduce he might have extended his scheme. I began where he left off, and with the certain and stupendous fact that Indian owners had promised to give 31 lakhs of rupees to control the market. They say that straws show which way the wind blows, but the above was no "straw"; it was the "set" of a strong current. If we can guide that current, our difficulties will vanish.

Let us examine the hidden meaning of "the Cess." Germany pays a bounty to its sugar producers, that is to say it pays a Cess on every pound of sugar exported; but it forces every soul in the country to pay its share in that Cess. Is Germany poorer by the amount paid as bonus? If not, then nothing has been paid by Germany. Have Ceylon owners paid their Cess? If not, who has paid it? Of course, *new* consumers of tea have paid it; had there been no new consumers, the growers would have been heavier losers than they are now; their only fault was that they did not go far enough. Your Cess is a 100 horse-power engine. You have so far used only one

horse-power and have failed to move your industry, I advocate the use of 10 horse-power by India and Ceylon combined. Will you forgive me for pointing out that your writers are more ready to advance objections to any scheme than to forward any ideas of their own.

Your recent Green Tea Syndicate scheme is a case in point, and the balance is on the side of objections. Mr Fraser shows that the scheme is practicable, but doubts whether money can be obtained. He says that the Cess should be doubled, and this is quite right, and if we want a Black Tea fund, the Cess must be quintupled.

Mr Ryan recommends you to be slim, wily, and up-to-date; India has been so "slim" that it refused to take money from the buyers and customers, and Ceylon was so "wily" that it restricted the amount taken to an insufficient sum. It is "economy" to refrain from spending money on Foreign Markets, but it is real political economy to get enough for the purpose out of the buyers and consumers; anyhow it is the best policy.

For the future I recommend that everyone who enters the discussion shall give his name. We know the names of the men who speak at Association meetings, and by giving names to the press we can form an informal Association. The weakness of newspaper discussion lies in the fact that the whole discussion is not placed before the readers. I collected all the "crisis" letters to the *Indian Gardening and Planting*, and made a book of them; it would cost about 400/ to 500/ to print all this as a pamphlet but the result would be great. I have seen all the "pros and cons" and I am convinced that the scheme I advocate is feasible. The "Pros" are so decided and sensible, and the "Cons" so weak and futile, that I have no doubt of success if the matter could be placed before Tea men in a condensed form. I interviewed a few heads of Tea firms in Calcutta and found that they had not had time to study the question in full, and it seemed to me that with time and opportunity I could convert them to favour the Cess.

We have absolute indications that the British Tea producer is willing to adopt measures for reform when he considers them sufficient. They know that a small Cess is not sufficient and that is the reason why they have not spoken of it sooner. They imagined that "reduction" was a *sufficient* measure and promptly promised to reduce 14 millions. It was the insufficiency of the measure that stopped your Ceylon growers from promising their proportionate amount. Now I *have* put before them measures which will be *sufficient*, and I have no doubt of success, because I do not judge by castles in the air, but by past *solid facts*, and by experience.

If Messrs. Rosling, Ryan, and Fraser, &c., &c., will place any other scheme which has even the look of being *sufficient*, they need not doubt of success. You take it for granted that opposition comes from men with their eyes open; try the method of discovering whether these men really *do* know all sides of the question to the same extent as you yourself know it.

The fate of the Private Tea Sales should show that growers are tired of being fed on chaff, and that they intend to get "wheat" somehow. I believe in your Ceylon men because they *have done* things to secure unity and strength amongst Tea growers. I have that sure ground to stand on when I appeal to them to go further, and to go far enough.

A. COOKE.

PLANTING IN BRITISH NORTH BORNEO:

TOBACCO—CARDAMOMS—COTTON.

Kandy, Aug. 30.

Dear Sir,—The following news I have today received from British North Borneo may be interesting to your readers:—"Our tobacco industry is holding its own. I should like to see some one try cardamom planting which is such a success in Ceylon.

"Enquiries are being made regarding land for cotton which grows here like a weed. Ceylon men might find a good opening here as cotton planters.

"The railway is nearly finished and we will soon have many Chinese settled between Jesselton and Beaufort."—Yours truly,

W. D. GIBBON,
Agent, British North Borneo Government.

[Ceylon men had better first see what land the Northern Railway is to make available in Ceylon, with cheap labour, for Cotton and Tobacco.—Ed. *T.A.*]

TOBACCO-GROWING IN NORTH BORNEO AND CEYLON.

Kandy, Sept. 5.

Dear Sir,—Our correspondence regarding the merits of British North Borneo and Ceylon is of service to both countries. What I contend is that tobacco wrapper leaf is acknowledged to be a profitable cultivation in Sumatra and British North Borneo where they have undoubtedly now a suitable soil, rainfall and transport facilities.

I know nothing about rice or cotton cultivation either in Ceylon or British North Borneo, but I do know that tobacco wrapper leaf cultivation was a ghastly failure in Ceylon, though we had Sumatra experts and capitalists on the spot to watch its cultivation.—Yours truly,

W. D. G.

[Tobacco-growing by Europeans in the tropics is surely the most uncertain of pursuits—one year giving large fortunes and another yielding little or no profit. We were in Amsterdam in 1891 when Java and Sumatra Tobacco companies were so depressed that Dutch friends of our acquaintance were ready to sell out at a fraction of what they had paid in. Since then, there has been a great recovery, and Mr. Turing Mackenzie now reports "£10,000" or "£20,000" as a Sumatra Company's Manager's Commission in one year! In Ceylon even, we know of the grand return Mr. Vollar got from one Dumbara crop of tobacco (all used as "wrapper leaf"?) but such a handsome return was, we believe, never afterwards repeated. We do not, for a moment, deny the advantages of North Borneo as a tobacco-growing country; but seeing the risks attending the transfer of

men with limited capital to a new country, we have said that there should be room erelong in Ceylon for new ventures in cultivation, in connection with the public works now under construction.—Ed. *T.A.*.]

PLANTING NOTES.

The Consumption of Quinine—in the United States, is rapidly increasing. For the year ended 30th June last, there was an increase of one million ounces in the consumption as compared with the previous year, and nearly three-fourths of the world's supply are now required for America. There is every prospect of a keen demand and good prices for bark and the febrifuge.

Mr. Cooke's Tea Scheme.—Mr. Cooke deserves a better reward than we fear he is likely to obtain. His latest reply(see page 255) to an objector who has not grasped his full proposals is lucid and satisfactory, except that we are now told the reserved tea will be kept by the producers until wired for. Hitherto we understood the tea was to be ready on the spot to meet the demand, whenever created.

The Teapot in India.—Fanciful in much of his imagination, perhaps, but practical in at least two or three suggestions he makes, is Sir Edwin Arnold in his useful contribution to the literature of tea expansion, which we quote on page 248 from the *Daily Telegraph* of Aug. 3. He points out carefully what an improving effect tea is likely to have on the native health, habit and character. It will obviate the dire drinking of unboiled water; it will be nourishing, and (but we query this) act as a digestive, and it will promote peace, socially! There are minor slips, *e.g.*, in speaking of the agency hous es of Messrs. Finlay *and* Messrs. Muir; but the article is well worth reading.

Coffee-Tea.—A correspondent writes to the editor of the *Queensland Agricultural Journal*—As you invited experiences *re* coffee-tea in the *Queensland Agricultural Journal* of March last, I am very pleased to send you mine. I acquired it when on a selection, on the road to Emu Park from Rockhampton. Having then an experimental plot of about twenty coffee trees growing, and reading that tea made from coffee leaves dried was very highly esteemed in some coffee countries, I determined trying it for myself. First, I dried leaves in the sun, but the product was disagreeably tasted when tried. Finally, I dried some leaves in a camp-oven, slung so as to swing over a fire, keeping them constantly stirred until they were dry and fairly crisp. Tea made from them was much enjoyed by all who tasted it; and one who did was the editor of the Rockhampton Bulletin at that time, but dead now for years past. He greatly enjoyed it, and my wife and I liked it better than any tea we could purchase. I intend growing a few coffee-trees for the leaves only, where I am now, as I am sure, if it be only dried properly, we could disspense with tea, povided we had sufficient coffee leaves to make our own tea from. To dry it properly is everything. It must be done quickly, and done to a turn; it has an aroma and flavour that any lover of tea would enjoy.—*Planting Opinion*, Aug. 23.

The West Indian Bulletin—No. 11, Vol. II, last received, is an unusually interesting number, and includes a variety of useful papers, such as "The treatment of soils in Orchard cultivation in the tropics" by the Hon. F. Watts, F.I.C., F.C.S., Government Analytical and Agricultural Chemist to the Leeward Islands; the Marine Resources of the B. W. Indies, by Dr. Duerden, A.R.C.S.; the cultivation of Onions at Antigua by W. N. Sands, Curator of Botanic Station; Artificial Drying of Cacao by G W Smith; Zebu Cattle and Breeding for Beef in Trinidad by C. W. Meaden of the Government Farm; but, above all, an illustrated paper on "Rubber Planting in the West Indies" by J H Hart, F.L.S., Superintenden, R. B. Gardens, Trinidad, with the resulting discussion. Mr. Hart quotes from our *T.A.*—Dr. Morris mentioned that the Mexican rubber, *Castilloa*, had answered admirably in Honduras as a shade for cacao. The largest tree in Trinidad is over 75 feet high with a girth of 6 feet at 3 feet from the ground; others planted in 1886 are 58 feet high and 60 inches in girth. One of these on being tapped gave 2·14 lb. of rubber fluids and ·69, or 32 per cent of clean rubber. We must quote at length in our monthly periodical.

The Prospects of Coffee in Brazil.—The accounts of the Dumont Company for the past year, says the *Brazilian Review*, conclusively prove two points—that, when properly managed, coffee estates can yet be made to yield handsome profits, and the advantage of efficient over the careless and unscientific methods that have generally prevailed. By strict attention to economy and the introduction of the most modern machinery the quality of the output of the Dumont has been so improved as to command an average price of 40s 2d per cwt, more than 12½ per cent. better than the average quotation for "Santos, good average" for the same period. However planters may grumble, the future of coffee is all right. If the present owners cannot work at a profit there will not be wanting others with more energy and more capital to put the industry into shape and make it pay once more. The future of coffee lies in co-operation and the introduction of more economical methods, the improvement of quality and more attention to grading. By the concentration of a dozen or so small plantations into one property, the present wasteful and inefficient administration must be economised and replaced by scientific treatment and every advantage taken of the hydraulic power so abundantly provided in many districts by Nature, by which the cost of handling and transport on the estate might be reduced at least to half. The slow and costly "terreiro" process will have to be given up and the coffee be dried mechanically, probably also by electricity. In fact coffee planting is yet in an almost primitive state. The creaking wooden-axled bullock cart is still the common means of conveyance, and drying as primitive as in the year 1. Something has been done in the way of pulping and hulling machinery, but as far as cultivation itself is concerned everything is primitive. At present plantations are going almost for the asking in some districts and offer a splendid opportunity to men of energy, imbued with modern notions of the superiority of machinery and science to brute force and rule of thumb, for lucrative investment of capital.

Green Tea Syndicate.—We direct attention to a letter from Mr. Drummond Deane (see page 203) with a good deal of interesting information in respect of Green Tea. In regard to the Syndicate, our correspondent should know that scarcity of capital, and the difficulty of reconciling contending mercantile interests stand in the way of its local formation, however desirable in theory it may appear to be.

Sailing Through a Sea of Bananas.—Captain Farrant, of the London-owned steamer Aldborough, on his arrival at New Orleans told a remarkable incident of the passage. He thought he had lost his reckoning in Crooked Island Passage, and had steered into a banana plantation. The blue waters of the passage threw a shade of green over them ahead of the vessel, when the Aldborough, which was going at about nine knots speed, began to throw bunches of bananas from each bow. It was then seen that what appeared to be an emerald sea was a perfect sea of bananas surrounding the vessel. The crew tried to hook them with anything at hand, the coal-heavers bringing coal-baskets into requisition but with all their efforts none were captured. Captain Farrant could not account for the bananas in the sea until it was know that the Norwegian steamer "Uller" had been ashore and had jettisoned about two-thirds of her cargo of bananas before she could be floated.—*Perth Herald*, Aug. 23.

Glasgow Exhibition, Blackman Export Company, Ltd.—The Blackman Company's Exhibit covering 700 sq. feet is an interesting one. Seventeen of their well-known Blackman Fans are shown in motion, the largest of which, 96 inches in diameter, is driven from the shafting overhead by means of a belt; others varying from 72" to 12" in diameter are driven direct by electric current, these Fans being combined with Electric Motors of the Company's own manufacture, especially designed for this class of work. Four of the Fans deliver air, warm or cold at pleasure, from the four sides of the upper part of a central column or Kiosk, which is a prominent feature of the Stand. On this Stand there is also a Model Drying Installation consisting of a drying compartment arranged in conjunction with a Blackman Electric Fan 24" in diameter and suitable Radiators for heating the air. The main advantages gained by the Blackman System of drying is that almost every class of material and produce is effectively and rapidly treated with the greatest economy both in cost of drying and in the space occupied by the drying chambers, whilst the quality of the material so dried is much superior to that baked or stewed in closed stoves. Twenty-four Blackman Electric Fans are used for ventilating the restaurants in different parts of the Exhibition. Messrs. McKillip and McKenzie have 14 of them, from 24" to 42" in diameter, in Restaurants Nos. 1, 2 and 3, where their cooling and ventilating effect is highly appreciated. Four others of similar sizes are used by Mr. Jenkins in Restaurant No. 5; two more in the Indian Theatre, and two in the Bermaline Model Bakery. An imposing addition to the Exhibit is a large assortment of Keith's patent Hyrdraulic Rams and Pumps, Heating Apparatus, and High Pressure Gas Lamps of great brilliancy, for which the Blackman Export Company, Ltd., of 70, Finsbury Pavement, London, E.C. are the Exporting Agents.

"Dr. Koch's Mode of Treating Malaria" —says a local medical authority—" should be given a trial. We have not yet learnt whence the organisms come, when the ground is turned up. This is not satisfactorily discovered. We hope to arrive at it soon."

Vanilla.—Although only a small supply offered at auction the demand was poor, and only part sold, at about 1s decline, as follows:—Seychelles: 7 to 8 inches, 15s to 18s; 3 to 7 inches, 11s to 15s 6d; and common splits, 3s 6d to 10s 6d per lb. Mauritius: good, 7½ to 8½ inches, 20s; 6½ to 7 inches, 18s 6d to 19s; 6 to 6½ inches, 15s to 17s 6d; and common splits, 10s to 15s 6d. Bourbon: fair, 5½ to 7 inches, 15s to 15s 6d. The export of vanilla from Mexico decreased considerably both in quantity and value during 1900, as the frosts and rains in the early paid of the year and the want of the latter at the proper season spoilt the plants, and the crop was subsequently lost. The quantity exported was 60,921 lb, as against 133,675 lb in 1809, and the values were respectively 62,565*l* and 181.547*l*. Vanilla is now receiving the attention of many of the American agricultural companies whose properties are in the State of Vera Cruz, and it is quite probable that the exports during 1901 will, under normal conditions, be greater than in 1900—*Chemist and Druggist*, Aug. 24.

Plants and Electricity.—M. Berthelot announces he has proved that the development of plants is affected by electricity. He has been carrying out the experiments at his country seat at Meudon, near Paris. A tower nearly 90 feet high is erected in the grounds, which M Berthelot has been using for experimenting on the influence of natural electricity in transferring to plants free nitrogen from the atmosphere, and also for studying the variations produced on plants by altitude. One of M Berthelot's experiments was directed to proving that a plant submitted to the influence of electric waves absorbs more nitrogen than another plant placed under the same conditions, but not influenced by electricity. M Berthelot considers he is justified in supposing that he has fully demonstrated that free nitrogen in the atmosphere plays an important part in the life of plants, on the ground that crops of vegetables are obtained in high altitudes without the use of artificial manure, owing to the greater tension of the electricity.—*Chemist and Druggist*, Aug. 10.

Mr. R. V. Webster's Letter from Honolulu—on page 253—offers a wondeful comment on the speeches in favour of the Tea Commissioner at the recent meeting. To our evening contemporary, with whom Mr. Webster used to be a far greater favorite than Mr. Mackenzie, this contribution ought to prove perfectly delightful reading. The "Thirty Committee" will now see what one of their Agents thinks of the other's work We verily believe Mr. Webster is perfectly right as to secret partial payments to certain favorites, *enraging 9-10ths of the American tea dealers against the very name of "Ceylon tea."* We said this would be the result of the secret policy, at the beginning, and have repeated our opinion at intervals ever since. Ceylon tea, in fact, would have been in a far better position in the United States, if not a single secret or partial payment had ever been made: a million of rupees have, probably, gone for worse than nothing.

THE HAPUGAHALANDE TEA COMPANY, LIMITED

REPORT OF THE DIRECTORS.

The seventh annual general meeting of the shareholders was held at the Company's Registered Office, 22 Baillie Street, Fort, Colombo, today at 11·30 a m., there were present :—Messrs A Cantlay in the Chair, Keith Rollo, R Davidson, Wm. Taylor, Wm. Milne, (by Attorney R Davidson) ; Mrs Grace Stanton (by her Attorney A Cantlay), and Tudor Stanton for Agents and Secretaries.

The Secretaries read the notice convening the meeting as it appeared in the Government *Gazette* of 2nd August 1901 and then the minutes of general meeting of shareholders held on 18th August 1900 which were confirmed.

The report and accounts having been taken as read, the Chairman favourably moved the adoption of same. This was duly seconded and unanimously adopted. A dividend at the rate of 5 per cent for season 1900-1901 payable forthwith was then declared.

Mr A Cantlay was re-elected a Director and Mr John Guthrie appointed auditor for the current season on the usual fee.

With a vote of thanks to the Chairman the proceedings terminated. Appended is the report :

ACREAGE.

	A.	R.	P.
Tea in full and partial bearing ...	385	0	0
Jungle, &c.	369	1	3
Total Acreage ...	754	1	3

Your Directors beg to submit their annual report and accounts for the twelve months ending 30th June, 1901.

The quantity of tea manufactured for the season (including estate and bought leaf, but exclusive of that manufactured for other estates) was 181·020 lb.

Estimating the unsold tea at a safe valuation, the nett amount realised for this product has been R49,050·27, equal to an average of R27·09 per lb.

After setting aside R3,293·58 for depreciation on buildings and machinery, the sum available for distribution (including R1,861·14 brought forward from last account) is R13,992·13. From this sum the Directors recommend payment of a dividend of 5 per cent absorbing R8,500, and leaving R5,492·13 to be carried forward.

In terms of the articles of association Mr Alex. Cantlay retires from the Board of Directors and is eligible for re-election.

The appointment of an Auditor for the current season will rest with the meeting.

THE WANARAJAH TEA COMPANY OF CEYLON, LIMITED.

REPORT OF THE DIRECTORS.

ACREAGE :

			Acres
Tea in bearing ..	1,028 acres		
1896	12 ,,		
1898	20 ,,		
			1,060 in tea
Timber Trees ..	..	..	20
Forest ..	..	..	27
Grass not available ..	..	..	27
	Total	..	1,134 acres

The Directors have the pleasure of presenting to the Shareholders the Report, Balance Sheet, and Profit and Loss account for the year ending 30th June, 1901.

The crop harvested amounted to 436,945 lb., against an estimate of 420,000 lb. The crop for 1900 was lb. 447,235. This result may be considered satisfactory in view of the slightly finer plucking considered necessary to meet the altered conditions of the market.

Lb. 279,529 have been sold in London at an average of 51·55 cents, but it is not anticipated that the balance will realise so high a figure.

Manure.—The estimate provided for 311 acres. The acreage completed was 333, at a cost of R13,187, or R39·66 per acre.

The amount at the credit of Profit and Loss account is ...	R107,820·00
Including the balance brought forward of ...	R 42,376·56

in which is incorporated a sum of R7,372·32, being the amount underestimated in last year's account for Tea in store or afloat. After payment of an Interim Dividend of 5 per cent there remains a sum of R86,975 available, which the Directors recommend to be applied as follows :—

To a final dividend of 12 per cent. making a total of 17 per cent. for the year ...	R45,360
To be carried forward ...	R41,615
	R86,975

The estimated crop for the season 1901/1902 is 440,000 lb. of made Tea.

The Visiting Agent's reports can be seen by Shareholders at the Company's Offices.

Mr. J C Dunbar retires from the Board by rotation, but is eligible for re-election.

The election of an Auditor for the ensuing year rests with the Shareholders.

By Order of the Board
Baker & Hall,
Agents and Secretaries.

CLUNES ESTATES COMPANY OF CEYLON, LIMITED.

REPORT OF DIRECTORS,

Clunes Division.

Superintendent :—R. O. De Saram, Esq.

Tea in bearing	340 Acres.
Tea in partial bearing	50 ,,
Forest	174 ,,
Total	564 Acres.

Errcht Division.

Superintendent :—S. Layard, Esq.

Tea in bearing	361 Acres.
Tea in partial bearing	142 ,,
Forest and Waste Land	244 ,,
Total	747 Acres.
Grand Total ...	1,311 Acres.

The Directors now submit to the Shareholders Accounts and Balance Sheet of the Company for the year ending 30th June, 1901.

The amount of crop secured was very disappointing—*i.e.* : 392,880 lb. against an estimate of 468,000. The shortfall of 75,120 lb. being due partly to unfavourable weather and partly to the adoption of a fine system of plucking necessitated by the serious drop in prices in common teas experienced for the last eight months. The nett average price realized was 25·60—whilst the cost of production was 21·67 cents per lb. which included the cost of manuring 140 acres.

After providing the usual sums for Depreciation of Buildings and Machinery, the result of the year's working shews a nett profit of R3,203·78, equal to about 1 per cent on the paid up Capital of the Company. To this must be added the balance of R3,667·23 brought forward from last year, bringing the total at credit of Profit and Loss Account to R6,871·01.

The Directors recommend that a sum of R2,500 be transferred to the Extension Fund and that the balance of R4,371·01 be carried forward to next year's account.

It will be noticed that the loans have been further reduced during the past year—and that Government has acquired rather over 6 acres of land for Railway purposes.

The estimate for the season 1901-1902 is 453,000 lb of Tea against an expenditure on Working Account of R88,553.20.

The estimated expenditure on Capital Account is R5,600 for extension to Erracht Factory, not undertaken last year.

In terms of the Articles of Association Hon. Mr. W H Figg now retires from the Board but is eligible for re-election.

The appointment of an Auditor for the current year will rest with the meeting.

ST. HELIER'S TEA COMPANY.

The Ninth Annual Ordinary General Meeting of this Company was to have been held on the 7th ult. at the office of Messrs. Bois Bros. and Co., but did not take place on account of the want of a quorum. The following is the directors' report:—

ACREAGE.

250	acres	in bearing	
29	do	planted in	1896
34	do	do	1898
313	acres		
114	do	Jungle, &c.	
Total 427	acres		

The Directors have now the pleasure to submit their Ninth Annual Report to the 30th June last.

The crop, which was originally estimated at 105,000 lb. of made tea to the 30th June, has turned out only 88,181 lb., realizing and average price of 33·03 cents per lb. as against 36·29 last year.

The cost of the tea in Colombo, exclusive of the sum of R885·61 expended on Capital Account, works out at 28·05 cents per lb., as against 24·65 cents per lb. last season.

The Visiting Agent's report, dated 4th August, 1901, can be seen by the Shareholders at the Company's office.

The Directors much regret having to record the death of Mr. W Sandys Thomas, who had been connected with the Company since its inception. Mr. H G Bois was appointed to the seat thereby rendered vacant, and retires in accordance with the Articles of Association, but, being eligible, offers for re-election.

Mr. Stanley Bois retires from the board by rotation, but, being eligible, also offers himself for re-election.

The Shareholders will have to elect an Auditor for the season for 1901-02.

KANAN DEVAN HILLS PRODUCE COMPANY, LIMITED,

REPORT OF THE DIRECTORS

for the year ending 30th November, 1900, to be submitted to the fourth annual ordinary general meeting of shareholders of the Kanan Devan Hill Produce Company, Limited, to be held in the registered office of the Company, 22, West Nile Street, Glasgow, on Monday, the 26th day of August, 1901, at two o'clock p.m.

The Directors have now to submit their report for the year ending 30th November, 1900. The crop gathered during the season from the tea estates amounted to 1,444,695 lb, and realized an average of 7·27d per lb. The coffee amounted to 1,400 cwts, and cinchona to 555,089 lb. The amount at credit of profit and loss account, after providing for commission on profits to tea estate Managers, Agents in Calcutta, and Secretaries, interest and discount on bills &c., and dividend on preference shares, is £10,037 7s 8d. Out of this the Directors propose to pay a dividend at the rate of 3½ per cent. on the ordinary shares, payable on 30th August, 1901 This will absorb £9,100, leaving a balance of £937 7s 8d to be carried forward to the following year. Considering the unprecedented crisis which has prevailed in the tea market during the past six months, the result is satisfactory. In Assam the properties are all in good order. In Travancore the progress in the important works in hand has not been so rapid as was anticipated. Communications have been much improved by the completion of the wire ropeway, which is now working satisfactorily. The cart road of 10 miles from Bodinayakanur to the foot of the hills, constructed by the Company's officers, has been inspected, approved, and taken over by Government, and it is believed that a Steam Tramway will be laid down on this road, and on to Ammayanaykanur, the station of the South Indian Railway where the Company's produce is despatched. The cart road from the top of the ropeway to the Company's headquarters at Munaar is now being metalled, and it is hoped this work will be finished by the end of the year, when permanent cart traffic will be established. Meantime, the one line tramway is working fairly well. Three new factories for the manufacture of the Company's tea were under construction during the year under review. These have been opened for manufacture during 1901 and are now fully equipped. Another factory is being erected, and three more are on order. Owing to want of accommodation and a defective water-course, full justice could not be done to the tea in 1900, but it is hoped, with the new factories mentioned above, a marked improvement in the quality will be effected during the year. Some of the 1901 invoices have been sold in the London market at a considerable improvement in price, and samples recently to hand show good valuations. An area of 2,763 acres new tea was added to the cultivation during the past year. The result of this planting was generally satisfactory, but the vacancies are being carefully supplied.

As the shareholders are aware, the Company's Concession in Travancore is considered one of the finest fields for cinchona in the East, and the Directors, finding the product to be profitable, are doing all they can to judiciously develop it. The cinchona tree yields the bark from which quinine, so much valued in medicine, is obtained. It has been arranged that 2½ millions cinchona seedlings, reared from specially selected seed, will be planted during 1901, and a similar quantity will be planted in 1902. These seedlings will be planted throughout the existing tea cultivation; and, as the growing and putting out of the plants will be practically the only expense incurred, the outlay will be small. The up-keep will cost little extra; and it is anticipated that a valuable crop of bark will thus be secured cheaply. With a view of obtaining the fullest information in regard to cinchona, the Directors recently sent one of their managers on a visit to the cinchona plantations of Java, and his report is both useful and encouraging. The Directors feel that, with its large holding in cinchona, the prospects of this Company are more assured than if they rested on tea and coffee alone. The greatest care will be taken to make the cinchona-planting a thorough success. The season in Assam, although a bad one generally, did not materially affect the Noakacharee Group of estates, the yield both in quantity and quality being fairly satisfactory, namely —898,128 lb against an estimate of 827,600 lb, while the average price realized was 7·88d per pound.

During the year under review the following extensions, arranged for shortly after the formation of the Company, have been made:—19 acres tea in Assam, 2,744 acres tea and sixty acres chichona in Travancore,

The total area under cultivation at 30th November last was 16,086 acres, namely, 14,441 acres tea, 944 acres coffee, 701 acres cinchona. The estimated crops for the current year are 2.217 225 lb of tea, 942 cwts of coffee, and 248.500 lb of cinchona bark. As explained in the circular letter of 7th August, addressed to the shareholders, Mr P R Buchanan, the special adviser to and visitor for the Board proceeded to India by the mail of January last and he, along with the managing agents in Calcutta and Colombo, and the Company's visiting superintendents, has been able to effect considerable economies in working without impairing the efficient up-keep of the estates, which should help the results of 1901 and subsequent years. In the circular of 7th August, above referred to, and in the circular of 9th ultimo, the Directors gave information regarding the position of the tea industry and the prospects of the Company.

In terms of the articles of association one of the Directors, Sir Robert D Moncreiffe, Bart., retires at this time and is eligible for re-election.

The auditors, Messrs Alexander Sloan & Co., C. A., retire, and offer themselves for re-election.

POSITION OF TEA AND ADMINISTRATION OF TEA COMPANIES.

The *Financial Times* has published several letters of late on the position of tea from a shareholder's point of view. The main object most of the correspondents have in view is the necessity for accelerating the production of annual reports and bringing pressure to bear on directors, so that there shall be no keeping back of information.

Mr. George Seton, writing to our contemporary on the position of tea and the administration of tea companies, says:—"It is now, I think, generally admitted that the chief cause of the present disastrous position of the tea industry is to be found in the undue additions to the planted area, which have been made during the past ten years or more. The earlier large extensions were made by new companies, which were formed avowedly with the object of planting out entirely new gardens. These were, of course, the original and chief sinners in the race of competition and over-production, but they had this excuse that, to all appearances, the Indian exchange was progressively falling, and there seemed every reason to believe that this favourable influence would continue. Since 1894 or 1895, however the principal extensions have been made, as additions to their areas, in all the different districts by the older companies, which already possessed large productive properties, and they have been made with a full knowledge of impending unfavourable conditions—a high rupee and dropping prices for tea It has been contended, however, by the administrations of these companies that this course was prudent, and was forced upon them by the necessity of providing against a known depreciation of their older gardens. Granted that this contention was right, it was to be expected that the entire cost of such improvements would be charged to revenue. But what do we find to be the case? Of all the leading companies only a few—notably the Assam, the Jorehaut, Bramapootra, Chubwa, and (in a measure) the Assam Frontier—followed this course, and their additions to area were of modest extent. Nearly all the other large companies carried the cost of these additions wholly, or in very large part, to block account. Some of them—wise in their generation—made fresh capital provision at a favourable time. Doom Dooma, owing to the exceptional soundness of its finance, could always raise fresh capital when required; Jhanzie issued capital at the top of the tea boom at almost Consol rate of interest; Jokai issued preference capital, and also accumulated a real invested reserve. But what of others whom we shall allude to alphabetically to avoid invidious distinction? The Dooars Company has more than outspent its entire reserve; the Empire Company has done the same, and now suspends preference dividends; the Imperial Company, the Lungla Company, the Makum, the Nedeem and Singlo Companies all developed their gardens on borrowed money, and either have had, or will have, to raise heavy prior charges, which practically cut off shareholders for a series of years from any hope of dividends. Possibly those responsible for these laches will point to English railway administrations, and say they have 'sinned in good company' but this like folly of our railway kings is now, I think, generally condemned both by the financial Press and by public opinion. Railway companies moreover had the excuse that these heavy betterments were forced on them by the public demand for increased facilities and by Government pressure. Tea men had no such excuse, and in any case two blacks do not make a white. The prevention of such errors of the past, with a due control of the policy to be followed in the future, is a work well suited for the Tea Shareholders' Association, the formation of which has been advocated so ably in your columns; this question, moreover, touches very closely on the matter of the appointment of auditors, so ably treated of by one of your correspondents only a few days since, as depreciation and additions to block are essentially an auditor's matter."—*Home and Colonial Mail*, Aug. 9.

THE NYASSALAND COFFEE COMPANY'S ESTATE.

SALE WITHDRAWN AFTER A BID OF £300.

The auction sale of the Nyassaland Coffee Company's estate was held on the 7th ult. but the highest bid was £300, and the estate was withdrawn. The plant on the estate was also withdrawn on account of the low figures offered.—*Central African Times*, July 13.

Tea Growing in Louisiana.—From the thirteenth annual report of the Agricultural Experiment Stations of the Louisiana State University and A and M College, for 1900, just received we learn :—

Tea Plants.—In co-operation with the United States Department of Agriculture, this Station is growing over six hundred tea plants, with a view of testing practically the raising and curing of tea leaves. The success of the industry in South Carolina has stimulated the Department of Agriculture to try it elsewhere in the South.

It will take some time yet before six hundred plants develop into plantations of thousands of acres required to enable America to do without foreign tea!

Test for Exhausted Tea.—Dr. Nestler in the *Journal de Pharmacie d' Alsace-Lorraine*, puts forward a test to determine whether tea leaf has been previously used or not. Professor Tickhominow's test is said to be untrustworthy. This depends on the production of a greenish tint by unused tea after two days' standing in a solution of acetate of copper. Tea which has been twice infused, however, will sometimes give this colour. Dr. Nestler's test is as follows: A little of the tea is crushed between the fingers and placed on a watch-glass. This is covered with another watch-glass, and heated gently. On the upper glass there is soon an appearance of small drops, and after ten minutes' heating crystals of theine are visible to the naked eye. The identity of these crystals can be shown by hydrochlorio acid and a solution of chloride of gold, which gives a more or less yellowish prisms of a silky, long, slender character.

PRODUCE PLANTING AND COMMERCIAL NOTES.

THE RUSSIAN EXPERIMENTS IN TEA GROWING,

like those in the Southern States of America, do not suffer for lack of advertisement. The news of the success of these experiments in both countries is noised abroad at intervals, and expectations are raise which, if fulfilled, may at some future date have an effect on the tea markets of the world; but this will not be just yet. Referring to the Russian experiments, the Vienna correspondent of *The Times* says (Aug. 21st):—"According to Austro-Hungarian official reports the efforts that are being made to introduce the cultivation of the tea plant in the eastern districts of the Trans-Caucasian territory are proving successful. The plantations in the neighbourhood of Batoum are flourishing and the two crops already gathered were very satisfactory. The series of experimental plantations established last year on the Caucasian coast of the Black Sea are to be greatly extended. Further plantations are to be started this year in Mingrelia and the Sukham district. Up to the present the plants have chiefly consisted of slips grown from Chinese seed. This year it is decided to try the species known as kangru, which has yielded excellent results on an estate at Tchakva belonging to the Imperial family."

OPPOSITION TO SECRET TEA AUCTIONS.

Active opposition to the secret tea auctions is shown wherever grocers congregate. The Metropolitan Grocers, Provision Dealers, and Oilmen's Association passed a resolution last week appealing to the Grocers' Federation to issue a circular on the subject, and the Bradford Grocers' Association made a formal protest also. The *Grocer* last week again publishes a list of marks of tea sold at the private sales. It also publishes a letter on the subject in which the writers say: "It is evident that an organised attempt is being made by the brokers, wholesalers, and big retailers to get the conditions of tea sales back to a level of the old times which were so good for the wholesale teaman. The retail grocer (what is left of him) has, however, had quite as keen a time as his friend above, and having been brought to the grindstone by Government-fed competition, combinations of every kind, 'presents' humbug, bonus delusions, pension weeds stamp trick, and war tax oppression, he is of necessity no longer the easy-going tradesman of those 'good old times,' but has perforce to keep himself posted with all the means at his command, and will accordingly kick against this attempt to put on the extinguisher and bid him shut his eyes, open his cheque-book, and take what 'plums' the 'secret' dealer has to send. Probably the country grocers have been waiting for the trade associations to give the ball a start, and, unless the Federation does vigorously take up the matter, it should put up the shutters." The *Grocer*, commenting on this, says: "We strongly sympathise with the writers of the above excellent letter, but have not much faith in the black-list idea. Most firms buy at the secret sales in order to pick up bargains thereat. The exposure should rather be of those who, to make the secret auctions a success, agreed to boycott the public sales and so damage the legitimate and proper method of conducting the wholesale tea business.—*H and C Mail*, Aug. 23.

St. Helier's Tea Company.—We publish on page 260 the annual report of the directors which shows a shortage in crop of 16,819 lb., as compared with the estimate, while the average price realised was only 33·03 cents per lb as against 36·29 in the previous year. The cost of the tea in Colombo had also been greater.

UGANDA AS A RUBBER-PRODUCING DIRTRICT.

SIR H JOHNSTON'S REPORT.

About one-fifth of the area of the Uganda Protectorate is covered more or less densely wi h rubber-producing trees and vines, principally belonging to the Apocynaceous order (Tabernæ montana, Landolphia). There is said also to be a species of real gutta-percha tree, but of this I have no certain prooof. The rubber derived from the above-mentioned sources is of very good quality, and the samples which we have submitted to examination on the east coast of Africa, and at Kew, though not quite properly prepared, have fetched from 2s to 3s per lb. A much larger consignment of various kinds of rubber is now on its way to England for examination. I regret that it should not have arrived in time for me to add to this report more definite particulars, but the matter must be treated of in a subsequent despatch, when Sir W Thiselton Dyer has examined the specimens. I can, however, speak confidently, both in regard to the extent of the country with rubber-producing trees and vines and to the average value of the rubber. When I first arrived in Uganda, I found the natives totally ignorant of the resources of their forests. They valued the rubber vines chiefly for their edible fruit, and the sap, if used at all in any local industries, was not known to have any commercial value. Mr Whyte, the director of the Scientific and Agricultural Department, assisted me to take the matter up, and the Uganda chiefs, once informed of the value of this industry, co operated in sending young men to to be instructed by Mr Whyte in the methods of procuring the rubber from the tree or vine without injury to the source of supply. We endeavour to impress on the natives that they must "milk" the trees, but not kill them, and that the trees or vines, dealt with properly in this fashion, furnish a continual revenue. Prior to this course of instruction, an agreement was concluded with the native chiefs, which brought all the forests of the Uganda Protectorate directly under the Crown. It has become, therefore, illegal for anyone to gather rubber in those forests without permission. But in order to encourage the nascent industry, I informed all the chiefs that until further notice, we would permit their people, without restriction, to obtain rubber from the Government forests on the understanding that they only did so after the manner prescribed by the Scientific Department. They would then be permitted to sell the rubber thus obtained at a reasonable price to the merchants, retaining the price received for their own benefit. The Government profit comes in through the establishment of a 15 per cent ad valorem duty on rubber exported from the Protectorate. The buying price, duty, and other expenses combined, should bring up the local cost of the rubber to the merchant to 1s per lb. Another 3d per lb would probably meet the entire cost of transport by the Uganda Railway and ocean steamer to a European market, where the eventual selling price might range between 2s and 2s 6d per lb, so that something like 100 per cent profit ought to be made on the transaction. I have not up to the present time taken any steps to regulate the native price of the rubber; but, in consideration of the facilities we afford the natives, I think it would be as well, later on, to limit their selling price to the merchants to a maximum of 9d per lb. I am not in favour, personally, of granting at present any exclusive concessions of rubber forests to individuals or associations. I think it would be far better to adopt, experimentally, the plan I have sketched forth of allowing the native, under proper supervision, to gather the rubber and to sell it to all and sundry at his own price up to a reasonable maximum. The Government profit would, as I have pointed out, be represented by the export duty, which I found already established in the Protectorate before my arrival. I

consider, therefore, that all parts of the Protectorate, bearing in any profusion rubber trees or vines, should be kept under Government control. Of course, if the native does not spring to the advantages offered him, and remains too lazy to gather the rubber, we must consider some other method of producing it for sale. Considering how deeply the various missionary societies are interested in the welfare of the natives, it might not be out of place to suggest that they should in their schools give technical instruction on the subject of rubber-collecting, and urge on the natives the importance of taking a leading share in this industry. —*India-Rubber and Gutta-Percha Journal*, Aug. 5.

MANUFACTURE OF COCONUT BUTTER.

We have had our attention drawn to an article that appeared in your *Journal* in May last (see *ante* p. 535), with reference to the manufacture of coconut butter in Germany, but we fear that the prominence given to a foreign manufacture (while the fact that the same article was originally invented and manufactured in this country is entirely ignored) may mislead some of your readers. It is no doubt most interesting to your readers to learn that coconut butter is made in Mannheim, and we trust that it is of equal interest to them to know that the same article is made in this country. Our factory at Silvertown was the first to produce coconut butter; and so large has the trade become that we have started a second factory at Liverpool. We believe that in this particular industry our foreign rivals have failed to secure the lead, as they have in many others, for the output of our two factories is believed to be greater than that of all other makers put together.

Our coconut butter and coconut suet, to which we give the registered trade names of "Nucoline" and "Vejsu," are sold in very considerable quantities by the leading stores in London and provincial towns, and are fairly well-known in the colonies and abroad, and most popular amongst Vegetarians, Jews, Mahomedans, and others who prefer vegetable to animal fats, on account of the guaranteed purity and economy. The sales to tropical climates, where the good keeping qualities of nucoline are much appreciated, increase rapidly. For retail trade, nucoline is packed in tins of various sizes, from 1 lb upwards, and the price compares favourably with the foreign makes.

We also make several harder fats from the same source, specially for manufacturing confectioners; in fact the predecessors of this company were the original makers of "Cocos Butter," which is now so extensively used in the manufacture of chocolates and other sweets.

We trust that, with this information before you, you will correct any possible misunderstanding on the part of your readers that the centre of the coconut butter industry is situated abroad.

FRANCIS T LODER, Managing Director.
Loders & Nucoline, Ltd,,
Cairn Mills, Silvertown, London,
31st July 1901.
—*Journal of the Society of Arts* Agu. 9.

"JOURNAL D'AGRICULTURE TROPICAL."

Such is the title of a new French Magazine, commenced last month in Paris (10 Rue Delambre) and published by M. J. Vilbouchevitch. It aims at supplying information not only for planters and scientific men, but also for investors, those engaged in commerce with colonial products or in supplying material for the colonies; in fact it aims at serving a commercial as well as planting community. In Paris, four years ago, M. Henri Lecomte started a similar brochure, called "La Revue des Cultures Coloniales," but we learn that this does not meet the wants of the Colonial public, edited as it is now by a Doctor of Law. Then, there is "L'Agriculture Pratique des Pays Chauds," but this is a bulletin of the *Jardin Colonial*, an official publication appearing every two months, and is likely to be too bulky and documentary, to embrace matter culled from various tropical countries outside the limit of the French colonies.

There are excellent publications in the French Colonies in Réunion, Mauritius, New Caledonia, Indo-China and Madagascar, from which the editors hope to quote and they refer to the *Bulletin Agricole de la Martinique*, edited by Messieurs Landes, Saussière and Thierry as having been a remarkabl paper. But this new venture is not intended as a rival to all these but rather will work together with them. The publisher writes:—"We hope to bring forward products such as the Ramie which are not yet profitable for Europeans but offer problems that interest hundreds of investors and planters. We shall avoid dwelling on products that are almost monopolised by countries to which the French language does not penetrate. We shall reserve a little corner for European vegetables and fruit trees which, while not calling for any big outlay, add a pleasure to life in the tropics. To the tropical fruits, among which some are so delicious, we shall steadily revert as they are increasingly exported to Europe. Cattle and poultry, bees and silk-worms will also engage our attention, and, as we become rich, we hope further to enlarge our scope." In the present number the following are the subjects of the chief articles: Sisal Hemp and the other fibre-yielding aloes: Machines for the preparation of Hemp fibre; The Ground nut and its enemies; Good and bad Castilloa; The Mulberry of Tonkin; Coffee in the Transvaal; Plantains, sweet and cooking ones, and methods of drying; Reviews of books; Commercial aspects.

INDIAN TEA MANUFACTURE, 1901 SEASON.
ESTIMATE FOR THE REST OF THE SEASON.
184 MILLION POUNDS FOR THE YEAR.

CALCUTTA, Aug. 29.

The following has been issued by the Indian Tea Association:—

"The tea manufactured to August 15th is

Assam ...	... 29,549,019 lb.
Cachar ...	... 9,996,256 lb.
Sylhet	... 11,581,497 lb.
Darjeeling ...	... 4,330,034 lb.
Terai	... 1,525,254 lb.
Dooars ...	... 11,430,509 lb.
Chota Nagpore	... 80,600 lb.
Chittagong ...	... 319,562 lb.
Kangra Valley	... 2,200,000 lb.
Dehra Dun, ...	... 1,153,794 lb.
Total ...	... 72,166,525 lb.

Calcutta, Aug. 29, 4-8 p.m.

The continuation of the Indian Tea Association's statement reads:—

"The balance of tea to be made is:—

Assam	...	... 40,775,333 lb.
Cachar	...	... 14 292 421 lb.
Sylhet	...	... 19.839 723 lb.
Darjeeling	...	... 3,178 390 lb.
Terai	...	... 1,605 040 lb.
Dooars	...	... 18,524 426 lb.
Chota Nagpore		... 73 000 lb.
Chittagong ...		... 551,837 lb.
KangraValley		... 870,000 lb.
Dehra Dun ...		... 670,000 lb.
Total ...		...100,380,170 lb.
[Total manufactured		... 72,166,525 lb.
Total for 1901 season		...172,546,695 lb.]*

To this there must be added:—

Kumacn ...	... 300,000 lb.
Outside Gardens	... 11,500,000 lb.
[Grand total	...184,346,695 lb]

The shipments to America and the Colonies and other ports are estimated at 25,000,000 lb. and, to meet local and trans-frontier demand 9,000,000 lb. which leaves 150,000,000 lb. for Great Britain."

[We give the totals we have arrived at, but our correspondent telegraphs 172,496,695 lb. as the total, for 1901 season,* showing a difference of 50,000 lb. unaccounted for.—Ed. *T.A.*]

"VEGETALINE": A PRODUCT FROM REFINING THE COCONUT.

Anxious housewives will be glad to know that "Vegetaline," made by a Marseilles firm by refining the oil extracted from the copra (dried coconut), and now placed on the English market, is not, as was feared, an imitation butter, or even a substitute for butter in its domestic uses. According to Messrs. McAulay Brothers, the maker's agents, "vegetaline" is almost entirely a manufacturer's article, although it can be used in the kitchen for making pastry, and will be supplied in retail if there is any demand for it. But the value of the process by which "vegetaline" is made will, it is claimed, be in providing bakers and biscuit manufacturers with a substitute for butter which is not only pure and cheap, but which, for biscuits in particular, is better than butter. "Vegetaline" only resembles butter in its fatty nature; it is white, and much harder than the dairy product.—*Daily Express*, August 15.

UNIQUE USE FOR THE PLANTAIN.

Amongst the multifarious purposes to which the indispensable plantain is put, surely the most unique is to make it yield a substitute for salt in cooking! Mr B C Basu, in a bulletin recently issued by the Assam Agricultural Department, asserts that alkaline water, made from the plantain, is used to an amazing extent by the natives of the Province in this way. The sheaths of the fruit and the thick corn are dried and reduced to ashes, which are kept till required for use. To extract the alkali the ash is put in a pot, which has a few holes in the bottom lightly plugged with straw. Water is added and the filtrate which runs off is caught in another pot, and is ready for use. When the sheaths alone are used the process is even simpler. The ashes are placed in a cup of water and in a few minutes the solution is prepared. The practice seems to have grown up in Assam when common salt was scarce and could only be drawn from Bhutan and the Naga Hills. That it should be persisted in now, when fine Liverpool salt can be purchased in every country shop and the custom of bartering paddy for salt prevails in the country at the foot of the Bhutan Hills, is a remarkable instance of the tenacity with which the native clings to his ancient customs.—*Times of India*, Aug. 29.

THE MOSQUITO THEORY.

RIDDEN TO DEATH: ANOTHER PHASE: THE LAGOS VIEW.

There seems to be an impression in Lagos that the great new mosquito theory is being ridden to death. The *Lagos Standard* characterises it as "a craze which threatens to cause as much annoyance and inconvenience as the ravages of the much-maligned insect itself." The latest development is that, owing to water in the houses being likely to breed mosquitoes, the Sanitary Inspectors have been commissioned to enter into private dwellings and overturn and destroy utensils used for storing water. The wisdom of this edict is, in the opinion of our contemporary, more than questionable. "How our Sanitary Inspectors, who have had no particular training in that respect, can tell the larvae of the mosquito is not very clear. Besides, it is very hard lines that the Government will not provide the town with pure drinking water, and after people have been to the trouble of getting good water from Apapa and other distant places, they should lose not only the water, but their utensils as well. When the authorities have filled up the many swamps that abound in the island town of Lagos, and looked after the drains, so that there will not be so many stagnant pools and muddy puddles in the most prominent streets after every heavy downpour of rain, it will be time enough to interfere with the domestic arrangements of peaceable householders."

The *Lagos Weekly Record* takes the same tone, saying that the new regulation implies a very serious interference with the domestic concerns of individuals and will doubtless lead to much vexation and trouble. The mosquito will breed everywhere and anywhere, and putting people under privation in this way is not likely to retard or prevent the process of breeding, as experience has shown.—*Central African Times*, July 27.

ZANZIBAR NOTES.

(From the Zanzibar *Gazette*, Aug. 14.)

PEARL DISCOVERIES.

Captain Oldfield has found a shell which, besides containing two very large pearls, is covered all over its inside with knotty pearly excrescences. Unfortunately the pearls, which are of a very good colour, are not regular in shape and are not therefore of much value, but this find shows that our pearl-oysters are really good ones and that the reputation enjoyed by Zanzibar and Pemba as pearl-producing Islands is quite justified.

EUCALYPTUS AND MOSQUITOES.

Sir,—In a recent issue a suggestion was made recommending the use of eucalyptus oil as a preventive against the bite of the mosquito. An

experience of mine proves the exact contrary. Staying some years ago with a friend in Venice, conversation after dinner turned upon this subject. Having noticed the large quantities of mosquitoes, and my friend suggesting the possibility of being bitten, recommended me to rub my face with the oil upon going to bed, and also to sprinkle a few drops upon my pillow. The next day on rising my face was bitten in many places, and very painful, thereby proving, to me at least, in the most satisfactory or unsatisfactory manner that the oil of eucalyptus has no virtue whatever in keeping the dreaded insects away.—Yours, &c.,

C. TATTERSHALL DODD.

Tunbridge Wells.

—*Morning Leader*, Aug. 12.

CENTRAL AFRICAN NEWS.

(*Central African Times*, July 13th.)

Mr Brown, formerly at Mount Zion Plantation, Mlanje, has become connected with the Church of Scotland Mission, and has gone to Domasi.

The rubber-collecting in most of the Luapula district is said to be getting pretty precarious at present, on account of the plants being used up. There is every likelihood that in the course of a year or two when other plants come away there will be plenty to be had.

We learn from the Secretary to the Chamber of Agriculture & Commerce that at a special meeting of the Committee of that body, held on the Thursday, the business was of an interesting nature. The subject of cotton growing was discussed at great length, and various opinions from gentlemen and firms interested in the question were put before the meeting. It was felt that the great drawback to an industry in cotton is the high rates of freight. The Secretary has had some correspondence with the Administration on the subject of the new coffee seed, but we regret to hear the seed may not be available for this year's nurseries. This is a great misfortune, but we hope that some of it may yet be in time for this season.

July 27th.—Mr Blenkiron and Mr Casson, of the B.C A. Administration, left for home on Sunday morning on furlough.

Mr Theo. Cox has been very successful in raising a most excellent crop of tobacco grown from American and other seeds at Nyamitete Estate, Cholo. The crop is now being harvested, and should give a very fair return.

CHRISTMAS ISLAND PHOSPHATES.

In the course of his report on his recent visit to Christmas Island, Mr. L H Clayton states :—

"That two kinds of phosphates are found on the island—lump and granulated. The latter has the appearance of coarse white sand. A large number of narrow pits have been dug, and the quantity of phosphate discovered has been enormous. Mr Clayton says the latest estimates of the amount of phosphates on Phosphate Hill is 12,000,000 tons. He expects that 75,000 tons will be shipped this year, against 37,000 tons in 1900."—*Chemist and Druggist*, Aug. 10.

VENEZUELAN PEARLS.

One of the principal sources of the wealth of the Venezuelan Island of Margarita lies in its pearl fisheries. The pearls of Margarita have been known since the discovery of the island by Columbus and his followers. It was on this island and on the mainland adjoining that the Spaniards found the natives decked with pearls. History claims that these pearls were one of the prime causes of trouble among the adventurers who first visited and settled on those shores. Pearls having lately risen in value, there has been extraordinary activity on the island. Buyers from different parts of the world reside there, and purchase from the native fishermen the products of their industry. About four hundred sailing boats are used by the natives in the fisheries of Margarita and its neighbouring islands of Moche and Mubagua. The principal beds are at El Tirano, north-east, and Macanao, North-west of Margarita. About two thousand men find constant employment in this trade. The fishermen use metal scoops which are dragged over the oyster beds, and when filled brought to the surface where the shells are opened and carefully examined. The boats in use are from 3 to 15 tons, and pay to the Venezuelan authorities about 12s each for permits to fish. According to Consul Goldschmidt, the pearls are very fine in quality, beautiful in lustre, and run from white to yellow in colour ; occasionally a black one, priceless in value, is brought to the surface. One white pearl of large size and good quality was sold in Margarita and not long since for £340. The shell of the oyster is not of much commercial value being too thin for the manufacture of buttons and other fancy articles such as are made from the Oriental pearl shell ; this, it is stated, is due to the short life of the Margaritan pearl oyster, eight years being about the average age. Pearls from dead oysters have very little value, as they lose their lustre. A French company has recently started fishing for pearls by means of divers and diving apparatus, and expect great results from their enterprise. The divers claim that they can select the larger oysters and leave the smaller undisturbed giving them time to grow and increase in value. This company, at the head of which is a prominent jewel merchant, purchased the concession from a Venezuelan, and must pay the Venezuelan Government 10 per cent royalty on the profits of the enterprise. The value of pearls found near Margarita is estimated at about £120,000 a year. Most of these pearls go to the Paris market, which, sellers claim, gives the best results. If the new method adopted by the French company is successful, the output of pearls will, it is stated, be considerably increased in quality and value in the future.—*Journal of the Society of Arts*, August 9.

A GIGANTIC SUNFLOWER.

An enormous Russian sunflower has been grown at Manly by Mr. J A Beal, of the Lands Department. The plant only bore one flower, which was 14 inches in diameter when cut. It is not often that such large flowers are seen, although we believe that in England specimens of Sutton's giant sunflower have attained a diameter of 16 inches, the plants being 10 feet in height.—*Queensland Agricultural Journal*, August 1.

PEARLS IN THE PHILIPPINES.

Colonel Clarence R Edwards, chief of insular division, War Department, is preparing a gazetteer of the Philippine Islands which will contain much valuable information from official and other sources. He has just completed a comprehensive account of the pearl and shell fisheries of the Sulu archipelago. During the year 1899 the value of shells, not sawed, cut, polished or otherwise manufactured, imported into the United States for home consumption was $969,319, and in 1900 $1,016,723. The manufactures of shells, mother-of-pearl, etc., are now almost entirely confined to the United States. In the years above mentioned but $82,610·40 and $38,362·32 respectively of shell and mother-of-pearl manufactures of all kinds were entered for consumption. In regard to pearls, the best English expert says that the Sulu archipelago produces

the finest round pearls in the world. The known pearling area in the Sulu and Celebes seas possessions of the United States is 15,220 square miles. More than double that area possesses the physical conditions necessary to the best form of pearl oyster life and the nacreous shell which contains it. Siassi, in the Tapul group of the Sulu archipelago, is the strategic centre of the most active pearling industry in United States territory, and should be made the station. There are a number of fishing villages and several thousand fishers in the vicinity. The value of pearls, in their natural state or split, imported into the United States for home consumption during nine months ending March 31st 1901 was $1 086,480, ranking next in value to diamonds.—*Chicago Record-Herald*, July 22nd.

MOSQUITOES AND DRAUGHTS.

Mr F G Aflalo writes in the *Morning Leader* of August 19th :—The mosquito, malarial or otherwise, appears to have a dread of draughts and air-currents generally, and small punkahs, worked by electric motors of one-sixth horsepower, are being used with excellent results in hotels and private houses in the States. The insect pests are found to avoid the rooms thus ventilated, and there is no reason why every bedroom in mosquito country should not be thus rendered immune.

THE WORK OF LEAVES.

Under the belief that the sun has a great deal to do with ripening fruit, many people remove the leaves of grape-vines and tomatoes to allow the sunlight to reach the fruit. *Meehan's Monthly* says—Sunlight does usually add to the sweetness and general good character of the fruit; but ripening is a vital process, in which an abundance of good, healthy foliage is the prominent agent in the work. In short, a bunch of grapes ripening in comparative darkness would be far preferable to one grown in the full light with most of the vine leaves taken off. But the leaves themselves must be vigorous and healthy. They are not healthy when crowded. For this reason, the good gardener thins out the weak branches in the early stage, so as to have plenty of room for the development of larger ones later on—*Queensland Agricultural Jonual*, August.

NILGIRIS BOTANIC GARDENS.

We are in receipt of Mr. Proudlock's Administration Report for 1900-01 which is as full, varied and interesting as usual. The following refers to his recent visit to Ceylon :—

The Curator visited the Royal Botanic Gardens Peradeniya, and the Botanic gardens at Hakgala and at Henaratgoda, Ceylon, in January 1901, in accordance with the orders of Government, for the purpose of seeing these gardens, of gaining information about rubber trees in Ceylon and of obtaining such species of plants as were unrepresented here. A list of desiderata was made and submitted to the Director of the Royal Botanic Gardens, Paradeniya. The seeds and plants asked for will be forwarded by him to Ootacamund from time to time as they can be spared in due course. Mr. Willis, the Director, very kindly showed the Curator, in the gardens and in the excellently-equipped laboratory at Peradeniya, the methods employed at Peradeniya and at Heneratgoda in tapping the Para rubber tree *Hevea* (*brasiliensis*), and in preparing the rubber for export.

Judging from the rapid growth made by the Para rubber trees at Heneratgoda (about 33 feet above sea level), it is a tree of considerable value that is eminently suitable for extensive cultivation in suitable situations in Southern India; while this opinion is amply confirmed by the growth made by trees of the same species at Burliyar (2,400 feet) on the Nilgiris.

The Curator desires to acknowledge the kind help and courtesy which he received at Peradeniya from Mr John C Willis, M A., the Director, from Mr Herbert Wright, Scientific Assistant, and from Mr Hugh Macmillan, the Curator; and at Hakgala Botanic gardens from Mr W Nock, the Superintendent.

From the notes on the Experimental Garden at Burliyar (we should like to know its situation, elevation, etc.) we quote some interesting paragraphs, which will be found on page 246.

THE INDIAN TEA CROP AND ESTIMATE: FOR THE SEASON, 1901-2.

We direct special attention to the remainder of the important statement issued by the Indian Tea Association, estimating the total crop for the current Season, the first portion of which we give on page 263 and in which we have only to make one slight correction—that the figure telegraphed for Dooars was, we find, 11,430,509 (not 11,435,109) lb.; this will give the total of tea already manufactured (up to August 15th) as 72,166,525, (not 72,171,125 lb.) On page 177 of our Directory it is shown that no estimate of the current crop had been issued up to June 5th and the figures elsewhere are therefore the first of their kind for the 1901-2 season. Seeing how the market is rising week by week, thanks to smaller outturn and finer plucking, we trust that the Indian difference of nearly 5½ million lb between Revised Estimate and Actual Outturn, for 1900, will not be realised again this year. The figures in question read :—

Actual outturn for 1900	...	187,527,435 lb.
Revised estimate of crop of 1900		182,144 874 lb.
	Difference:	5,382,561 lb.

Now the current estimate is, to begin with, 2,201,821 lb. ahead of the estimate last year, but with the considerable reduction of output that is taking place in India, we should hope that the actual outturn will prove quite within the estimate of 184,346,605—or a decrease of 3,180,830 lb. on the actual crop of 1900-01.—So may it prove.

THE INDIAN TEA CROP FOR 1901-2 (season ending 31st March) being now estimated at 184 296,695 lb. is expected to be 3¼ million lb. behind the actual crop of 1900-01; but for Great Britain, only 150 million lb. are estimated to be shipped this season or 10,753,157 lb. less than were sent to London in the past season, according to the statement of the Indian Association, although another statement shews the deficiency at less than two millions. With some million lb. less from China as well as Ceylon, there ought to be a considerable difference in London stocks by the end of the year.

RUBBER IN THE PEMBA ZANZIBAR FORESTS.

The chief interest in the forests centres about the rubber creeper, *Landophia Kirkii* (*Mpyo*). In some places the rubber creepers grow thickly, and in the others large areas are without any rubber. The *L. Kirkii* as it grows in Pemba is not a large creeper, rarely exceeding the thickness of a man's wrist. But it attains considerable length in creeping along the ground, or in linking itself over the houghs of the trees. The bark is red and rough and when sliced off liberates a snow-white latex which almost immediately coagulates into india-rubber. The process of collection requires some skill and experience to be profitably conducted. Where the vines are plentiful and rich, an experienced and industrious man will bring in as much 3 lbs. a day while an unskilled workman will scarcely gather a quarter of a pound. The general mode of collection consists in slicing off the bark in the form of scarfs at intervals of a few inches or a foot. When three or four scarfs have been made the collector dabs the wounds with salt water, which he carries in a calabash by his side for the purpose. The salt water causes the juice to coagulate as it exudes, preventing it from dripping to the ground and being wasted. He now leaves these scarfs and proceeds to make and treat others on the same vine or an adjacent one, after which he returns to his original group. This interval gives the rubber time to collect. The latex is now pure rubber and pulls off clean and white. With the ball he may have already gathered, the collector goes over each scarf in succession, merely rolling it along. The fresh rubber olings to the ball which grows in size, but does not cling to the fingers. If the colleotor has no salt water he smears the juice at once upon his arm when it coagulates rapidly. Probably the saline exudations of the skin assist the prooess.

A good deal of waste in the collection takes place if the men are left to themselves. They will, for instance, only operate upon those parts of the vines which are within easy reach, leaving the upper regions among the trees untapped. Again there is always an "aftermath" upon the creepers, which collects a quarter of an hour or so after it has apparently been done with. The "aftermath" consists of only a small quantity of rubber scarcely worth the collector's while to return and gather, but the accumulations from hundreds of vines amount to a good deal in a day and in time would sensibly affect the quantity gathered.

Growing side by side with *L. Kirkii* is another creeper known to the natives as *Mbungo*, It exudes a sticky juice if tapped. The juice, however, will not coagulate but clings tenaciously to the fingers like treacle Upon the application of heat it is converted into a semi-solid mass like putty.—*—Zanzibar Gazette*, Aug. 14.

MANY RUBBER SPECIES IN BOLIVIA

Sir Martin Conway, in his latest work, "In the Bolivian Andes," ascribed the rubber of south-western Bolivia—known commercially as Mollendo rubber—to the tree *Hevea lutea*. Sir Martin having previously stated, in a lecture before the Society of Arts in London, his impression that the rubber tree of this region was the *Hevea Brasiliensis*, some interest has been felt as to the cause of the change in his conclusion. On this point he has written to us as follows:

To the Editor of the *India Rubber World*: *Hevea lutea* is, I believe, the chief form of *Hevea* on the eastern slope of the Andes. My authority is the collection in the Kew herbarium, which has specimens of *Hevea lutea* from that district, but none of *H. Brasiliensis* except from regions forther east and lower down. My own specimens were only leaves, and insufficient to determine the species.

My information is to the effect that rubber is extracted, along the eastern slope and foothills of the Cordillera Real, in Bolivia, from some twelve different kinds of trees. What are they? No one knows. I have just sent a properly-equipped botanist to spend a year investigating the matter from a purely scientific point of view, and I shall present a complete set of his collected specimens to the New York herbarium. We shall then know something definite.

I have received specimens of yet another kind of *Hevea* from the southeast of Bolivia, but the specimens are not good enough for complete description. There doubtless exist heaps of kinds of rubbers in the Amazon basin about which we know nothing.

MARTIN CONWAY.

Red House, Hornton Street, London, W., July 3, 1901.

The exploration work begun by Sir Martin Conway in Bolivia, referred to already in the *India Rubber World*, is to be continued by a party organised and equipped by this gentleman, and which left London on June 26, to be absent a year. At New Year the party were joined by the botanist mentioned in Sir Martin's letter, Mr. Robert S Williams, one of the senior aids of the New York Botanical Garden. It is to this institution, by the way, that the specimens collected are to be sent. The New York Botanical Garden of late has developed into an establishment of much importance, and its herbarium bids fair soon to rank with those at Kew and Berlin. There is now being arranged a collection of over 3,000 fine specimens obtained for the garden in Colombia, and which is described as one of the most important collections of herbarium material that ever came out of tropical America. The scientific directors are much interested in whatever pertains to a fuller knowledge of rubber-producing species. By the way, there is now at the garden a rubber plant grown from a seed of an undetermined species obtained from Colombia in the collection mentioned above.

The rate of increase in the exports of Bolivian rubber *via* Mollendo, on the Pacific coast, recorded from time to time in the *India Rubber World*, seems not to have been maintained latterly. Our last return published was for the fiscal year 1898-99—1,037,127 pounds, of which 793,418 pounds appear to have been shipped in the first half of the period. There is now at hand a return for the calendar year 1900, as follows: Shipped to Liverpool, 314,162 pounds; to London, 22,752; to Hamburg, 240,033; to Havre 37,816; to New York, 1751: total, 616,514 pounds. —*India Rubber World*, Aug. 1.

ASSAM AND CEYLON COOLIES' WAGES COMPARED.

On the topic of wages, Mr Cotton says in his report, just issued, on Labour Immigration in Assam ;—

The most remarkable feature of the figures fo 1900 is that they show a lower rate of wages than the average of any year since 1895. Th amount is considerably below the statutory so-called minimum wage, and when the average is below the minimum of R5 and R4, it follows that in the majority of cases the minimum was not earned. Converted to a daily rate, the average wage paid to men has been a little over two annas and nine pies, and the average wage paid to women has been a little over two annas a day. This is a miserable average pittance, and leaves no room for doubt that employers have been endeavouring to effect economy in working at the expence of the labour force. Figures, and facts, when they are considered in connection with the annual expenditure of some 30 lakhs of rupees in acquiring coolies—an outlay which

would have been unnecessary if the wages offered were sufficient to attract labour—leave the Chief Commissioner more and more convinced that the insufficiency of wages is the most serious of the troubles from which the industry in Assam is suffering. He is no longer prepared to advocate half measures, and it is, in his opinion, a serious consideration whether the Legislature ought not now to accept the situation which the Secretary of State has always pointed out would be inevitable when the means of communication were improved and abolish a penal contract altogether and leave Assam planters to get their labour in the same manner that the Duars and Chittagong and Ceylon Planters obtain their supply. The case of Ceylon is particularly in point. The Chief Commissioner finds, from information published by a special correspondent in the *Englishman*, who wrote after making local enquiries on the island, that labour there is free and unfettered by indenture, or anything in the nature of agreement that either party cannot terminate with a month's notice; that the coolies are imported by sea from the Madras Presidency, and that the average cost of importing labour is only R10 per head; that men are paid a daily wage of 33 cents, or about 5½ annas, and women 25 cents, or exactly 4 annas; and that they receive, as they do in Assam, free quarters and medical attendance, etc. There is no labour difficulty in Ceylon, because the labourers are paid a fair market wage: but in Assam the difficulty is always present, and Mr Cotton's recent experience has led him to the conclusion that it will never cease until it is allowed to solve itself, without the assistance of Government, and without any kind of penal legislation, by the ordinary laws of supply and demand.

It appears to the *Englishman* that Mr Cotton here falls into the error of comparing the Tamil coolie with the Kol, with whom he has no analogy. The crux of the question is—are the coolies better off in Assam, or are they not, than they would have been if they had remained in their own country? Without analysing the figures supplied by the Assam Administration, we maintain that they are—or why do they emigrate with their families?—*Madras Mail*, August 28.

A NEW NATAL ORANGE.

In his district report to the *Agricultural Journal*, Mr. J L Knight, magistrate, Inanda, writes: It may not be generally known that a gentleman in this county, who is a scientific horticulturist by profession, has raised a new and very fine species or variety of orange, which he has decided to call the "Natal Victoria," the latter after our late Queen, with Natal prefixed to denote the country of its origin. I think the "Natal Mammoth" would have been a more appropriate name, as it is certainly a mammoth orange. It is without exception the most delicious orange I have ever eaten, with a flavour which is new and entirely its own. Some of the fruits have reached 25 oz. in weight, and measured 15½ in. in circumference. A little time since, one twig was picked with four oranges on it, which turned the scales at 5¼ lb the four and this notwithstanding that the tree had suffered severely from the drought last year, and has not yet quite recovered, and the size of the fruit, therefore, this season, not up to the usual average. The "discoverer" informs me that, given suitable soil, and a favourable season, the oranges will average at least 20 oz. The tree is quite distinct from all other oranges, very large, with curly leaves, and the seedlings partake of the parent tree, proving it to be a really distinct orange from all others. It is a most robust and vigorous grower; a few grafted four years ago are now in full bearing. The grower has at present some 200 young grafted trees for disposal, and hopes to have 600 more by this time next year. Any person, being desirous of obtaining young plants, could do so by applying to me for the address. In the meantime I may say that I have seen and tasted the oranges, and can vouch for the above facts. I have written entirely on my own initiative, and for that reason am unable to give the name of the grower.—*Natal Mercury*, August 5.

LADYBIRDS: A PENNY EACH.

An agent of Professor Lonsbury, of Cape Colony, is collecting 20,000 ladybirds in Massachusetts. One hundred children gather them in, and receive one penny each for them. The farmers, who never before appreciated their ladybirds, want the exportation stopped. They suggest a close season for the insects.—*Daily Express*, Aug. 6.

PROFESSOR KOCH ON MALARIA.

"When I was a student of medicine, we were taught that malaria was not an infection disease, *i.e.*, not transmissible from person to person, and that it was originated by inhaling bad air. It was regarded as the type of the miasmatic as contrasted with the contagious diseases. What a change has taken place since then! Now we know that malaria can be transmitted when one injects the blood of a malaria patient into the body of a healthy person,—a case, indeed, which does not occur under natural circumstances. We know also that malaria is not caused by gaseous substances but by micro-organisms, which belong to the category of the animal parasites, are imbibed by gnats with the blood they suck, further developed in the bodies of the gnats, and finally inoculated into healthy human beings again. So, according to the views now prevalent, malaria cannot possibly be produced without the co-operation of two factors, namely the malaria parasites and the gnats. * * *

PREVENTIVE MEASURES.

"Now a number of other measures, based on better knowledge of the etiology of malaria, have been proposed, of which the following are the most important. Firstly, people are advised to avoid the neighbourhood of malaria patients, and to fix their abode at least one mile away from places where malaria prevails. Secondly, it is proposed to exterminate the malaria-transmitting gnats by destroying their larvæ at the easily-accessible breeding places. Thirdly, human beings are to be protected against the gnats by wire-nets for their dwellings and by gloves and veils for their hands and faces. Fourthly, efforts are to be made to exterminate the malaria parasites by the rational use of quinine.

"It is obvious that these four proposals are theoretically of equal value. If one never has occasion to go near people suffering from malaria,

or if one is never stung by gnats one cannot get malaria: and if either the gnats or the malaria parasites are exterminated malaria must vanish for ever, because one of the factors absolutely necessary for its production has ceased to exist. How these proposals will stand the test of practice however, whether it is possible to carry them out to so general an extent as we had to suppose in estimating their theoretical value, is quite another question. The discussion of this question is of special interest at present, because experiments are now being made everywhere with a view to provingthe practicability of the measures I have mentioned. I believe, therefore, that I may count on your assent, if I choose the said measures for the theme of this lecture, and take the liberty to discuss the measure proposed by myself in somewhat fuller detail.

THE DRYING-UP OF SWAMPS.

"If we begin with the drying-up of swamps, a measure which has been known from of old, we must regard its efficacy as confirmed by manifold experience and consequently as proved. Now, indeed, we know that the effect is not due, as was formerly supposed, to the prevention of the rotting of vegetable matter which was supposed to emit the gases that caused the disease, but to the destruction of the breeding-places for the gnats. So, strictly speaking, this measure coincides with that aimed directly against the larvæ of the gnats, of which I shall speak later on. Formerly attention was paid almost exclusively to extensive swamps, which could be dried up by regulating rivers and by means of deep drains through which the water could flow off. In this way districts have not infrequently been freed of malaria. In those cases, however, the purpose was always gained by very expensive works, of which it cannot even always be said that they were necessary, for it has been discovered that the anopheles gnats, which are the chief transmitters of malaria, have their breeding-places much more frequently in little puddles and pools than in great swamps. Several times in New Guinea I saw many larvæ of anopheles gnats iu quite small gatherings of water, in wheel-marks and even in water-butts. In Italy I repeatedly found them in water-vessels which were placed in gardens for the purpose of watering the plants. In future, then, it will be necessary to pay attention to the small and even smallest gatherings of water—which can generally be rendered harmless by filling up or by frequent emptying—rather than to large swamp which cannot, as a rule, be easily got rid of. * * *

LARVICIDE.

"Of the direct extermination of the larvæ of the gnats by destroying the breeding-places, pouring petroleum into the water, or other larvicidal means the same may be said. * * *

SEGREGATION.

"The proposal to run away from malaria, so to speak, by living at least one mile away from all native settlements where malaria prevails, is one with which I have very little sympathy. * * *

NETS, VEILS AND GLOVES.

"The proposal to protect the inhabitants of malarial districts at night against the gnats' stings by nets, veils, and gloves sounds very plausible at first. It has been received with great enthusiasm, and has been acted upon in Italy at many places, and, to all appearance, with good success. But in the case of this measure, too, reasonable as it looks from the theoretical point of view, it was soon found that it admits of but very limited application in practice. In Italy at least the arrangements for securing houses against malaria seem not to have been resorted to yet, except in the case of the railway signalmen's cottages and some small railway stations; and as to the wearing of veils and gloves, it may perhaps be practicable in the Italian climate, but in the tropics the number of people that will willingly adopt this measure is not likely to be great.

QUININISING THE POPULATION.

"I come now to the measure proposed by myself, which aims at exterminating the malaria parasites in man by means of quinine. In making this proposal I presuppose two things, firstly, that the malaria parasites are restricted to man, and secondly, that we can destroy them, or at least render them harmless, by means of quinine. As to the first of these two presuppositions, I regard it as adequately proved by the fact that nobody has yet succeeded in finding parasites identical with the human malaria parasite in the blood of any animal. Just as little has anyone succeeded in artificially transmitting human malaria parasites to animals. The second presupposition is proved by the observation that may be made in medical practice every day that, when quinine is properly used, the malaria parasites disappear from the blood of the patient. The fact, it is true, does not afford certainty that they really are destroyed; they may have only disappeared from the circulating blood, but remained in the internal organs, especially in the spleen and in the bone-marrow. And in fact this is mostly the case after a single treatment with quinine, as the extreme frequency of relapses proves; the malaria parasites are not got rid of till after the treatment with quinine has been continued for a length of time.

"But as soon as one knows this effect o quinine on malaria parasites, one will of course not restrict one self to a single application of quinine, but will continue to give it in suitable doses till the parasites have really died. * * *

MICROSCOPIC EXAMINATION.

"If, therefore, we wish to render all, or as nearly as possible all, parasites innocuous by quinine, we must take chronic sufferers from malaria and also the children into account. But the only way to gain this end is to examine the blood of all persons suspected of malaria with the microscope. In all the attempts I have hitherto made to exterminate the malaria parasites I have acted on this principle, and have been able to convince myself that the execution of this measure is not o difficult as it may at first sight appear. * *

MOSQUITOES' PREDILECTIONS.

"A very interesting and also practically important fact strikingly observable at Fasana and partly at Stignano, too; the malariacases were specially numerous in certain houses and groups of houses, and these were in the periphery of the place, whereas the centre was almost free. I had occasion to make the same observation before at the town of Grosseto in Italy. From this we may conclude that the infecting mosquitoes do not fly anywhere and everywhere, or disperse equally over a place but have predilections for certain places. Now, in

combating malaria, it will be very advantageous to find out what places they prefer, and to pay special attention to such. From this focal behaviour of malaria I drew the practical conclusion that it is not necessary at the outset to free whole places or extensive regions of the malaria-parasites. It will be perfectly practicable to advance step by step, in exact accordance with the number of assistants at disposal, without havingto fear that the ground jnst freed of malaria will be at once reinundated by infected mosquitœs from the still malarial neighbouring districts.

THE EFFECTIVE QUININE DOSE.

"I now come to the question as to the best method of removing the parasites permanently from the blood of malaria-patients by treatment with quinine. With a view to deciding this question I have made very many experiments, and have arrived at the following results, which, for the rest, every observing physician who has frequent opportunities of treating malariapatients will find confirmed by his own experience. Doses of quinine of less than one gram (15·432 grains) are iusufficient for adults. The effect of the quinine is very greatly strengthened by giving full doses several days running. Considering these two facts, and iu order to minimise the use of quinine, I order one gram of quinine to be given two mornings running, which is repeated after an interval of nine days. This treatment must be continued for at least two months, or better three, because one is not safe till then against relapses. In obstinate cases one gives one gram of quinine three days running, and reduces the interval, if necessary, to seven days. In quartan-fever, which is well known to be the most obstinate form of malaria, quinine must be given three days running from the first. There are people with whom quinine does not agree if taken through the mouth; in such cases it must be given under the skin. The patient must be observed for a length of time after the treatment, and his blood must be examined from time to time, in order that one may be quite sure that he is permanently cured and free of malaria parasites. In malarial districts proper the combating of malaria will restrict itself in the main to the treatment of the children and of the persons who have immigrated in the immediately preceding years. To children under six months one generally gives one-tenth of a gram, to older ones more, according to their age. They generally stand quinine very well even in comparatively larger doses than adults, so that one need not hesitate to give children of five to six half a gram. They do not dislike it either, if given as a powder mixed with raspberry syrup, or if sweet tea or the like is given after it. If necessary, one can give euquinine, which, however, unfortunately cannot be used much, owing to its high price. For the rest, the treatment of children suffering from malaria is one of the most grateful tasks for a physician. When I arrived at Stephensort in New Guinea there were no children there. They had always died of malaria. I took special pains to protect the children that were born during my stay there, and those that came to the place with their parents against the pernicious influence of malaria. They were all examined from time to time for malaria parasites, and treated with quinine, if any were found. Under such treatment those children, whose number amounted at last to about a dozen, throve splendidly; not one of them died.

"The practicability of my method was proved by an experiment I made at Stephansort in New Guinea. It is a settlement of the New Guinea Company with 734 inhabitants. Of these 157, *i e*, 21·4 per cent, were suffering from malaria. This figure was soon reduced to a small remainder, consisting exclusively of quartan cases, and this favourable result was not a merely temporary one, but lasted till the date of the last news I received.

PRACTICAL TESTS OF DR. KOCH'S METHOD.

"Further experiments, testing the practical efficiency of my method, are going on at this moment in German South-West Africa and in the Brioni Islands, and experiments are to be begun soon in East Africa, and the former ones continued in New Guinea. At bottom, however, no further proofs of the value of my method are at all necessary, for the results of the extensive and successful attempts to stamp out malaria are already at our disposal. You are well aware that malaria was very prevalent in most European countries only thirty to forty years ago. Since then it has very rapidly diminished, aud now it has nearly everywhere wholly or almost wholly disappeared What I have just said is especiallyv true of Engand, France, Belgium, Holland, and Germany. Attempts have been made to explain this very striking decrease of malaria by the drying up of the swamps, but this explanation is by no means admissible. There still are swamps enough everywhere, and the transmitters of malaria, the anopheles gnats, are still to be foun in large numbers wherever malaria used to be. So there must be other reason, and the only other reasoe discoverable is the much more general use of quinine, which is the only deadly weapon we have against the malaria parasites. Quinine used to be so dear that only well-to-do people could get it. Moreover, since its use became more frequent, the doctors have learned to use it more rationally. So the number of malaria cases that were properly treated and permanently cured became greater and greater, whereas formerly every case was followed by endless relapses. Consequently the infectious matter has become rarer and rarer, and the anopheles gnats, which are probably just as numerous as they used to be, no jlh,, ger nd any malaria parasites to transmit.

T one prevalence of malaria in Germany only thirty years ago, and the extent to which it has diminished since then, is best shown by the statistics of the German army. In 1869 the number of cases still amounted to 54·5 per thousand; now it is 0·45 per thousand; that is, it is more that a hundred times rarer now than then. In 1874 the garrison of Spaudau, a fortress near Berlin, surrounded by swampy meadows, had 664 cases of malaria per thousand men; now, though the swamps are just as they were, the figure is one half to one per thousand. In Batavia and other towns in Dutch India, which used to be notorious for their malaria death rate, and were called "the European's Grave," a considerable improvement has taken place since the gratuitous dispensing of quinine was introduced.

THE CASE OF POLA.

"A very interesting illustration of what I am now saying came to my knowledge lately at Pola, the principal seaport of Istria. Being also a war-port, it has a large garrison, and it has from of old had the reputation of being severely infected with malaria. In 1864 the naval garrison there had 887

cases of malaria per thousand men. But the state of things gradually improved, and malaria has considerably diminished since then. In the last few years the number of malaria cases in the same part of the garrison has been only about 30 per thousand that is only one-thirtieth of what it used to be. In this case also people were disposed to ascribe the improvement to the drying up of two swampy meadows near the town, which was effected in the years 1868 to 1870. But apart from the fact that the decrease of the malaria was not simultaneous with the draining of the swampy meadows, but took place quite graudally and equably in the course of the last thirty years, at about the same rate as in the German army, there is another circumstance which speaks very decidedly against the causal connection between the decrease of the malaria and the draining of the meadows, namely the following: while malaria has been diminishing in the garrison it has been increasing among the civil population, which is no more and no less exposed to the influences of the climate and the soil, including the swamps near the town, than the garrison. In 1890 the number of malaria cases in Pola and its suburbs was 24·8 per thousand; since then it has risen to 132·5 in the year 1900, that is more than five-fold, and that not suddenly, but quite gradually. In the same period the number of cases in the garrison has gone down to one third. So here we have the striking phenomenon of an increase of the number of cases in one part of the population and a decrease in another in one and the same place. This can be due only to some difference in the circumstances of these two parts of the population, and the difference is that the garrison is under continual medical supervision, so that every case of malaria is at once properly treated, whereas among the civil population, for which medical assistance and quinine are too expensive, this is not the case.

"Of reasons, then that speak for the practicability of the measure proposed by me in different climates under different social circumstances, and on whatever scale one likes, there is certainly no lack. Nevertheless I do not ask you to come to a decision on this question just at this moment, when, as already stated, experiments testing the value of the various methods proposed are everywhere being made. In a few years the practical results of these experiments will be known to us, and then you may act on the good old saying "Prove all things; hold fast that which is good."
—*Pioneer*.

STRANGE CIRCULAR TO THE "MUIR" SHAREHOLDERS.

INADEQUATE REASONS GIVEN FOR DELAYING REPORTS AND ACCOUNTS.

On the top of the discussions that have recently taken place as to the position of Indian Tea Companies, the circular just issued by the Muir concerns comes with peculiar force and serves to illustrate in a sufficiently startling way the critical state of the industry. We believe this is the second communication of the kind the shareholders of these companies have received this summer, and therefore more interest attaches to the present document than at first sight appears. We reproduce the circular practically at length in order that our readers may fully appreciate the arguments set forth:—

Registered Offices—22, West Nile-street, Glasgow, 7th August, 1901.

Dear Sir,—

The Consolidated Tea and Lands Company, Ltd.
The Amalgamated Tea Estates Company, Ltd.
The Kanan Devan Hill Produce Company, Ltd.
The Anglo-American Direct Tea Trading Company, Ltd.

We are requested by the Directors of the above companies to inform you that the issue of the reports and accounts for year ending 30th November last has been unavoidably delayed by the absence in India of Mr P R Buchanan, the practical tea planting member of the Board, with whom the Directors have always hitherto consulted in the preparation of these documents, and with whom they are at present in communication in regard to same. As some shareholders are desirous to obtain information at this juncture, we think it right, meantime, to give the following particulars:—

The Consolidated Company has 52 estates in the Dooars, Assam, Sylhet, Darjeeling and Ceylon, with 28,806 acres under cultivation. The Amalgamated Company have 22 estates in Assam, Sylhet, Darjeeling and Ceylon, with 13,355 acres under cultivation. The Kanan Devan Company have 26 estates in Assam and Travancore, with 16,019 acres under cultivation. The Anglo-American Company have 27 estates in Assam, Cachar, Southern India and Ceylon, with 15,221 acres under cultivation.

Mr P R Buchanan, on whose advice these estates were originally purchased and planted, has already visited India four times with the view of promoting the interests of these Companies. Towards the end of last year Mr Buchanan, on account of the depressed state of the tea market, and the unfavourable prospects then prevailing, considered that it would be in the interests of the Companies that he should visit India and Ceylon that he might, from his practical experience, extending over many years, be able to advise and assist the managing agents, superintendents and managers on the spot in their services on behalf of the Companies. This offer the directors gladly accepted, and he left London for Ceylon by mail of 4th January.

While in India at this time Mr Buchanan's headquarters have been principally at Munar in Travancore, but he has been in close touch with the managers of the various estates in Northern India and Ceylon, and has had several important interviews with some of the Companies' superintendents and principal managers and has thus been enabled to suggest certain alterations and economies in the working of the estates by means of which improved qualities of tea are being produced at the lowest possible cost, and without impairing the efficient upkeep of the estates.

There can be no doubt that the present crisis is very acute, and that the tea industry has seen nothing like it since the year 1860, when a considerable number of planters in India suffered very severely.

Your directors, along with the directors of other companies, were prepared to support a scheme which was formulated about five months ago, to restrict production, but unfortunately through the apathy of the Ceylon planters, the scheme had to be abandoned.

The directors do not anticipate any immediate relief from the depression which is now existing,

and think it important that the shareholders should fully realise how much our four companies and other leading tea companies are affected by the recent legislation on the part of the home and Indian Governments. You would notice from previous communications there were three factors which exerted prejudicial effects on the tea industry:—

(1) The action of the Indian Government in arbitrarily fixing exchange at 1s 4d, for the rupee, irrespective of the rate that would be automatically fixed by the balance of trade.

(2) The large production of low-class tea in India and Ceylon.

(3) The increase of 50 per cent. by the home Government on the duty on tea.

These conditions still prevail, and the position has been accentuated by an increased production of both Indian and Ceylon teas.

While the scheme for restricting the production has fallen through, to some extent the object will be accomplished in consequence of the fact that a great many planters have resorted to finer plucking, which, combined with unfavourable weather at the start of the season in Assam, Sylhet, Cachar, Darjeeling and Dooars, will bring about a smaller out-turn than was anticipated some months ago.

In view of the production being thus curtailed, markets will, no doubt, in course of time, improve, and better prices will be obtained for the produce. Meantime, the directors would advise the shareholders to rest assured that no efforts will be wanting on the part of the officers of the companies to do everything possible to strengthen their position and enable them satisfactorily to weather the storm. The companies' estates are in thorough order and well-supplied with labour and machinery, and will bear comparison with any estates in their respective districts.

The teas produced have proved during the past year superior to, and in some cases far better than, other teas produced in the same districts, and the directors look forward with confidence to the result of the struggle in which these companies, in conjunction with all other tea companies, are engaged.

The tendency of the extremely low prices now ruling will be to force tea into consumption in places where it would not otherwise reach, and, with this in view, the directors are doing their utmost to assist in introducing tea amongst the natives of India......

The directors are also doing their best to encourage the consumption in other countries, and are specially engaged in endeavouring to find markets, for green tea, which, they think, can be manufactured on their estates to sell at a good profit.

As the Companies produce a large quantity of common tea, the present rate of duty, namely, 6d per lb., represents a very heavy percentage of the average price obtained for the tea.

The Chancellor of the Exchequer expected that the greater part of the increase of duty would be borne by the consumer, but in the case of Consolidated Tea and Lands Company, Ltd., the directors estimate that it suffers to the extent of 1¼d per lb, which means about £60,000, and this added to the amount referred to in last report, arising from loss from exchange, say, £22,677 represents £82,677.

The tea industry, like other businesses—such as coal, iron, cooper, cotton, tin, coffee, shipbuilding, &c.—will be subject to vicissitudes, and the directors hope that, just as these have had periods of depression followed by times of prosperity, the tea industry will emerge from the cloud which is overhanging it at present, and become again profitable as it has been in the past. We would remind you that the North and South Sylhet Tea Companies, which were merged in the Consolidated Tea and Lands Company, Ltd, had one of the highest records among good dividend-paying Indian tea companies. From 1882 to 1886 inclusive, while the plants were young and yielding little or no leaf, no profits were made from the newly-planted estates, but out of the profits of the seasons 1887 and 1888 the Companies paid to their shareholders compound interest at the rate of 5 per cent. per annum for the whole period of about five years during which the estates were practically non-productive, besides placing £16,000 to reserve account for depreciation. For the seven succeeding years—namely, from 1889 to 1895—in which latter year the properties were acquired by the Consolidated Company, sufficient profits were earned to pay an average dividend of 10 per cent. per annum on the capital paid up and to put aside £24,000 to reserve account for depreciation.

The Chairman of these four Companies in conjunction with Mr Buchanan, Sir Robert D Moncreiff, Bart, Mr. A B Murray and Mr A M Brown—being five of the directors of the present Boards—were amongst those who formed and conducted these successful Sylhet Companies, and they continue to manage the Consolidated, Amalgamated, Kanan Devan and Anglo-American Companies on precisely the same lines as were so successful in the case of the North and South Sylhet Tea Companies.

An arrangement has been made whereby a considerable quantity of the Companies' produce will, in future, be shipped from Chittagong to London, and it is expected that this will effect a substantial reduction in the cost of transit of tea from the estates to the London market.—We are, yours faithfully, JAMES FINLAY & Co., Secretaries.

The first point that will probably strike shareholders is that in all this lengthy pronouncement there is no sound reason adduced why the reports and accounts should not have been produced long ago. Though the financial year ends on 30th November, it has generally been July or August before any statements were issued, though they should have been out by April or May. No doubt some delay must arise through all four Companies being in one office, but a mere adjustment of staff ought to prevent any congestion of business there. Now we are asked to believe that because Mr Buchanan is away in India we cannot have the reports and accounts, notwithstanding the fact that his presence in the East cannot possibly influence events and finances that relate to a period months prior to his departure from Great Britain. When Sir John Muir and his colleagues put forward shallow reasons like this for not fulfilling one of the elementary duties of Directors to their shareholders, the public are apt to place a construction on such action that is by no means favourable to the position and prospects of the Companies. In the long review of the situation which is advanced as a substitute for a legitimate narrative of operations, there is nothing that can be held to affect the Muir undertakings worse than any others, and if there is a good excuse why these Muir undertakings should not reveal their trading position it must be an excuse that applies equally to all. Since other companies have published their reports, though in the case of most the financial year ends on 31st December and not on 30th Novem-

ber, we can only conclude that the Board is not over-anxious to reveal the result of working in 1899 1900, because it compares badly with previous terms. Of the Anglo-American Direct Tea Trading Company we have no details, but the dividend records of the other three concerns since they were formed are as follows :—

	1898-9.	1897-8.	1896-7.	1895-6.
	per cent.	per cent.	per cent.	per cent.
Consolidated ..	7	10	10	10
Amalgamated ..	10	12½	10	10
Kanan Devan ...	5	13	38	—

This is not such a bad showing, and no wonder Sir John Muir is anxious to delay spoiling the picture, it it is unpleasant news he is keeping back. The passing of the June Preference dividend of the Consolidated Tea and Lands does not make us very hopeful.

As to Mr. Buchanan's presence in India, it may be well to point out that he can exercise very little influence on the current season's operations. Planting was all over before he left these shores, and the most he can have done is to supervise the plucking, which one would have thought the local managers should have been regarded as quite competent to look after. Mr. Buchanan is, however, in ample time to initiate drastic reforms for the coming year—that is to say, for the period the account of which the shareholders may expect in the summer of 1903 ! If the circular had said this plainly, it might not have been supposed that an attempt was being made to use this visit to blind the eyes of proprietors to real issues. It is satisfactory to find that Sir John Muir is willing to stand in with the scheme of restricting production. It is also easy to understand why. His companies are responsible for much of the over-cultivation in the past, and as they were in the first to feel the effects of glutted markets owing to their lavish expenditure on extensions, it was to be expected they would readily grasp at any solution of the problem they had themselves created. But even now this adhesion seems to be only a qualified one. It is true the Muir concerns are restricting planting schemes in Assam, but what of the policy that is being pursued in Southern India ? The exports from the North will probably show a fair decline this season, but it is also pretty certain that from Madras the shipments will be nearly doubled. This is due almost entirely to the large developments in Travancore, where the Kanan Devan has huge estates. According to its own reports, it brought into cultivation under tea there in 1898-9 over two thousand six hundred acres and in 1899-1900 proposed to plant nearly three thousand acres more. During those same periods the additions in Assam were reckoned at only one hundred and thirty-four acres. The tea grown in Travancore is of a low grade quality, and must necessarily help more to depress prices than even an excess of better class descriptions.

To sum up the whole matter, then, there is no valid reason why the reports and accounts of these four Companies should not be immediately published, and the shareholders ought to bring pressure to bear on the Directors to produce them.—*Financia Times*, August 10.

PEARL AND PEARL SHELL FISHERIES.

IN CEYLON AND AUSTRALIAN WATERS.

(*To the Editor of "Nature."*)

In connection with Sir West Ridgeway's anxiety, as Governor of Ceylon, to revive the pearl fishery off the north-west coast of the island, and the appointment by the Secretary of State for the Colonies of so able a zoologist as Prof. Herdman to report on the subject—so classic to zoologists since Dr. Kelaart's paper and the display of fine examples of the pearl shells by the Indian Government in the London Fisheries Exhibition of 1883—it may be interesting to mention the activity of the Queensland Government in this and allied subjects. Besides the work of Mr. Saville Kent and the recent (private) investigations of Mr. Lyster Jameson, the Queensland Government early last year appointed an able young zoologist, Mr. James R Tosh, to make investigations on the life-history of the species which produces the pearl-shells of commerce, the formation and growth of pearls, and other questions bearing on the pearl fishery. He is now busy on Thursday Island. Moreover Mr. Tosh informs me that the Queensland Government has just sanctioned a grant of £1,500 for the erection of a marine laboratory on a small island about two miles distant (from Thursday Island), and in the centre of the pearl-fishing grounds, though at some distance from the coral area. This laboratory will have, besides the work-room and quarters for Mr. Tosh and his staff, three concrete tanks for experimental work.

W. C. McIntosh.

Barham, Springfield, Fife.

—*Nature*, Aug. 15.

PROGRESS AND PLANTING IN THE FEDERATED MALAY STATES.

(*From the Resident-General's Report for 1900.*)

The fortunate possession of extraordinarily large alluvial deposits of tin-ore, easily worked by Chinese miners, whose luxuries and vices are taxable, has been the basis of the financial prosperity of the States, and the development of this source of wealth has been rendered possibe by British methods of administration. To take, as an instance, the case of Perak, the most important and, at present, the wealthiest of the four States, the amount of duty collected on tin exported in 1877 was $140,292, while during the past year the collections amounted to $3,570,631. From the first days of protection the Government has kept in view the desirability, or rather the necessity, of encouraging agriculture, and slow but steady progress has been and is being made in this direction. The first year for which reliable figures of trade values (imports and exports) for Perak, Selangor and Negri Sembilan are available is 1882. The value of imports and exports for that year was $11,207,719. For 1900 the figures for the four States are—

Imports	$38,402,581
Exports	60,361,045
Total trade 1900 ..	$98,763,626

No cart roads and no railways were in existence in the States in 1875; at the close of 1900 the actual cart road mileages were as follows—

	Cart Roads. Miles.
Perak	586
Selangor	408
Negri Sembilan	249
Pahang	90
Total ...	1,333

in addition to some hundreds of miles of bridle paths and foot tracks. The construction of railways was first undertaken in Perak, where a short Government metre-gauge line of railway, eight miles in length, from the capital to the port, was opened for traffic in 1885. In September, 1886, a metre-gauge line, 22 miles in length, was completed by Government in Selangor, and a line connecting Port Dickson with Seremban, Negri Sembilan, 24½ miles long, was completed by a guaranteed company in 1891: total mileage up to 1891, 54½ miles. The total railway mileage open for traffic at the close of 1900 was:—

	Miles.
Perak .. .	114
Selangor	97¼
Negri Sembilan ..	24½ Private Co.
Total ...	235¾

to which may be added 23 miles in colonial territory, constructed and worked by the Federated Malay States. It is expected that by 1920 the completed mileage will be:—

Prai harbour, (opposite Penang, Province Wellesley), through Perak to Selangor boundary, with branch lines to Port Weld and to Telok Anson port	213¾ miles
From the Selangor boundary to Seremban (Negri Sembilan) with branch line to Kuala Klang ..	126 ,,
From Seremban to Port Dickson (Sungei Ujong Railway Company)..	24½ ,,
Probable total railway mileage, Federated Malay States and Province Wellesley, 1902	364¼ ,,

The length of telegraph wires under the charge of the Postal Departments is:—

Perak	680 miles
Selangor	515 ,,
Negri Sembilan	141½ ,,
Pahang	53 ,,
Total ..	1,389½ ,,

Education in former days was confined to learning to read the Koran by rote, and few of the common people could read or write. There are now 193 vernacular and State-aided schools in the Federated Malay States, with 8,092 scholars. To most of the vernacular schools, hospitals, again, were formerly unknown institutions. There are now Government free hospitals throughout the States, exclusive of Gaol Hospitals and Lunatic Asylums. The Government Medical Staff includes fourteen European qualified Surgeons, a Pathologist, eight European Nurses, and two European Veterinary Surgeons.

A regular Police Force was likewise an unknown quantity. The Police Force at present is composed of 1,970, besides Buglers, Drill Instructors, Detectives and 14 Troopers

The cultivation of sugar-cane is only practised to any extent in Perak, to which it has spread from the adjoining Colony. It is rapidly becoming an important and successful industry and it is to be hoped will, in time, extend to the other States or portions of them. A considerable amount of European and Chinese capital has been invested and machinery of the latest type is employed. The export of sugar from Perak for the last three years is given as:—

	Quantity. Pikuls.		Value.
1898 ..	274,720	..	1,214,701
1899 ...	276,689	..	1,282,237
1900 ...	278,156	..	1,315,974
	829,565	..	3,812,912

Owing to the continued large supplies of coffee from South America, the price for this product rules so low in the European markets that none but the best situated and best cultivated estates can ever earn sufficient to cover working expenses.

The European planters, with the pluck and determination which characterised the planters of Ceylon in former days, under somewhat similar adverse circumstances, have manfully turned to other forms of cultivation, Rubber (Para and Ficus Elasticus) and coconuts being most in favour, while still maintaining, in the greater number of cases, the upkeep of their coffee estates and waiting for better times. A large area has been planted with para rubber, which thrives well. Three years hence we should know what will be the result. The climate and rainfall of the Federated Malay States is all that can be desired for tropical agriculture, Indian labour is becoming cheap, fairly abundant and good, and the policy of the Government in investing its large mining receipts in the construction of roads and railways has afforded facilities to planters, which probably are not to be found in most tropical Colonies. An expert in the subject of gutta percha and rubber has been obtained from Kew, and his knowledge will doubtless prove of great value to the planters. Amongst other things he will superintend a Government experimental garden.

I regret to find that Mr. Belfield reports that the Selangor Ramie estate has practically discontinued cultivating that product for the present on account of want of demand for the fibre. Ramie is indigenous in the Peninsula.

The subject of irrigation has received attention during the past year. It has been found advisable, owing to the small number of the possible rice cultivators, not to indulge in heroic schemes as a rule, but to assist or undertake smaller ones where circumstances demand. The very important scheme sanctioned for the Krian district, Perak, is being ably carried out by Mr. R. O. N. Anderson, the Engineer in charge, who has had to contend with great diffi-

culties caused by the unhealhty nature of the work in the swamps. The revised estimates show a probable expenditure of over $900,000, the area benefited will be about 60,000 acres and the date of completion is put at December, 1903. An irrigation work of considerable magnitude is under consideration for the district of Lower Perak Five hundred acres of land are being made available for paddy cultivation by a system of sluices and channels, in the Ulu Selangor district.

EUROPEAN PLANTERS IN CEYLON.

In our summary of planting statistics up to the end of May last, we gave 1,544 as representing the total number of Managers and Superintendents on the Tea, Cacao, &c. plantations included in the Directory. We have now been asked to say what number of these are Europeans. To enable a proper return to be made we have had the General Directory analysed, with the result that a total of 1,697 names of European planters has been arrived at. But this includes 86 men who are resident in Travancore, no fewer than 235 who are away in Europe, &c., 92 with no address, and 25 who are coconut or cinnamon planters. This brings us down to a total of 1,261 European (tea and cacao) planters in active service against 263 Ceylonese Superintendents—apart from coconut and cinnamon estates where Europeans only number 25 against a vast preponderance of Ceylonese. It is noteworthy that for 92 "planters" in the Directory, there was no address given. Possibly a good many of these have left the island; but a certain proportion must be, like Mr. Micawber, waiting for something to turn up and perhaps therefore we should put the result as follows:—

European Tea, Cacaco Cardamom &c. planters in Ceylon ...	1,261
„ Out of billets (say)... ...	39
	1,300
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It has long been recognised that the Victorian Tea Act, which is now incorporated in the Customs Act of 1900, is far too liberal. For instance, in order that teas should be deemed to be "mixed with other substances," it is necessary that there should be evidence of some foreign substance being mixed with them. Dirty teas, mixed with broken leaves, stalks, tea seeds, or even decayed leaves, would not come within the category of "foreign substances." Further, teas not having proper strength or quality cannot be excluded unless it is shown that they have been artificially deprived of these properties. It is in this latter direction our law wants revision, so as to bring up the standard of quality in our imports. Such a proposal, it need hardly be said, would immediately create an outcry from those who make a handsome profit even at existing low retail prices. There is little doubt that if something were attempted in the direction indicated the bulk of the trade and the public generally would be largely benefitted. Further, it would prevent the reshipment to this State of the rubbish condemned in Great Britain, as well as in the other States.

COFFEE CULTIVATION IN SPAIN.

The cultivation of coffee for commercial purposes is about to be undertaken for the first time in the province of Malaga, at the little village of Campanillas, some five miles from the capital. Don Guirco Lopez, a merchant of Malaga will, according to Consul Ridgeley, begin by setting out from twenty thousand to fifty thousand coffee plants on his plantation there. As long as Cuba and Porto Rico were Spanish possessions, the cultivation of coffee in the peninsula

No cart roads and no railways were in existence in the States in 1875; at the close of 1900 the actual cart road mileages were as follows—

	Cart Roads. Miles.
Perak	586
Selangor	408
Negri Sembilan	249
Pahang	90
Total ...	1,333

in addition to some hundreds of miles of bridle paths and foot tracks. The construction of railways was first undertaken in Perak, where a short Government metre-gauge line of railway, eight miles in length, from the capital to the port, was opened for traffic in 1885. In September, 1886, a metre-gauge line, 22 miles in length, was completed by Government in Selangor, and a line connecting Port Dickson with Seremban, Negri Sembilan, 24½ miles long, was completed by a guaranteed company in 1891: total mileage up to 1891, 54½ miles. The total railway mileage open for traffic at the close of 1900 was :—

	Miles.
Perak .. .	114
Selangor	97¼
Negri Sembilan ..	24½ Private Co.
Total ...	235¾

to which may be added 23 miles in colonial territory, constructed and worked by the Federated Malay States. It is expected that by 1920 the completed mileage will be :—

Prai harbour, (opposite Penang, Province Wellesley), through Perak to Selangor boundary, with branch lines to Port Weld and to Telok Anson port	213¾ miles
From the Selangor boundary to Seremban (Negri Sembilan) with branch line to Kuala Klang ..	126 ,,
From Seremban to Port Dickson (Sungei Ujong Railway Company)..	24½ ,,
Probable total railway mileage, Federated Malay States and Province Wellesley, 1902	364½ ,,

The length of telegraph wires under the charge of the Postal Departments is :—

Perak	680 miles
Selangor	515 ,,
Negri Sembilan	141½ ,,
Pahang	53 ,,
Total ..	1,389½ ,,

Education in former days was confined to learning to read the Koran by rote, and few of the common people could read or write. There are now 193 vernacular and State-aided schools in the Federated Malay States, with 8,092 scholars. To most of the vernacular schools, hospitals, again, were formerly unknown institutions. There are now Government free hospitals throughout the States, exclusive of Gaol Hospitals and Lunatic Asylums. The Government Medical Staff includes fourteen European qualified Surgeons, a Pathologist, eight European Nurses, and two European Veterinary Surgeons.

A regular Police Force was likewise an unknown quantity. The Police Force at present is composed of 1,970, besides Buglers, Drill Instructors, Detectives and 14 Troopers

The cultivation of sugar-cane is only practised to any extent in Perak, to which it has spread from the adjoining Colony. It is rapidly becoming an important and successful industry and it is to be hoped will, in time, extend to the other States or portions of them. A considerable amount of European and Chinese capital has been invested and machinery of the latest type is employed. The export of sugar from Perak for the last three years is given as :—

	Quantity. Pikuls.	Value.
1898 ..	274,720 ..	1,214,701
1899 ...	276,689 ..	1,282,237
1900 ...	278,156 ..	1,315,974
	829,565 ..	3,812,912

Owing to the continued large supplies of coffee from South America, the price for this product rules so low in the European markets that noue but the best situated and best cultivated estates can ever earn sufficient to cover working expenses.

The European planters, with the pluck and determination which characterised the planters of Ceylon in former days, under somewhat similar adverse circumstances, have manfully turned to other forms of cultivation, Rubber (Para and Ficus Elasticus) and coconuts being most in favour, while still maintaining, in the greater number of cases, the upkeep of their coffee estates and waiting for better times. A large area has been planted with para rubber, which thrives well. Three years hence we should know what will be the result. The climate and rainfall of the Federated Malay States is all that can be desired for tropical agriculture, Indian labour is becoming cheap, fairly abundant and good, and the policy of the Government in investing its large mining receipts in the construction of roads and railways has afforded facilities to planters, which probably are not to be found in most tropical Colonies. An expert in the subject of gutta percha and rubber has been obtained from Kew, and his knowledge will doubtless prove of great value to the planters. Amongst other things he will superintend a Government experimental garden.

I regret to find that Mr. Belfield reports that the Selangor Ramie estate has practically discontinued cultivating that product for the present on account of want of demand for the fibre. Ramie is indigenous in the Peninsula.

The subject of irrigation has received attention during the past year. It has been found advisable, owing to the small number of the possible rice cultivators, not to indulge in heroic schemes as a rule, but to assist or undertake smaller ones where circumstances demand. The very important scheme sanctioned for the Krian district, Perak, is being ably carried out by Mr. R. O. N. Anderson, the Engineer in charge, who has had to contend with great diffi-

culties caused by the unhealhty nature of the work in the swamps. The revised estimates show a probable expenditure of over $900,000, the area benefited will be about 60,000 acres and the date of completion is put at December, 1903. An irrigation work of considerable magnitude is under consideration for the district of Lower Perak Five hundred acres of land are being made available for paddy cultivation by a system of sluices and channels, in the Ulu Selangor district.

EUROPEAN PLANTERS IN CEYLON.

In our summary of planting statistics up to the end of May last, we gave 1,544 as representing the total number of Managers and Superintendents on the Tea, Cacao, &c. plantations included in the Directory. We have now been asked to say what number of these are Europeans. To enable a proper return to be made we have had the General Directory analysed, with the result that a total of 1,697 names of European planters has been arrived at. But this includes 86 men who are resident in Travancore, no fewer than 235 who are away in Europe, &c., 92 with no address, and 25 who are coconut or cinnamon planters. This brings us down to a total of 1,261 European (tea and cacao) planters in active service against 263 Ceylonese Superintendents—apart from coconut and cinnamon estates where Europeans only number 25 against a vast preponderance of Ceylonese. It is noteworthy that for 92 "planters" in the Directory, there was no address given. Possibly a good many of these have left the island; but a certain proportion must be, like Mr. Micawber, waiting for something to turn up and perhaps therefore we should put the result as follows:—

European Tea, Cacaco Cardamom &c. planters in Ceylon ..	1,261
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of Spain was forbidden, but under present conditions the Government interposes no objection. Senor Lopez has already made some experiments, and is convinced that coffee can be advantageously grown in the province of Malaga and elsewhere in Andalusia. Others who have examined the question claim that there is not sufficient humidity in the Andalusian climate. Practical experiments on a large scale will be made, and the result is awaited with great interest. Cuba and Porto Rico formerly supplied Spain with nearly all her coffee, paying the Government at consumption tax of sixty pesetas per one hundred kilogrammes (£1 4s 5d per cwt) on all coffee entering the Peninsula. At present the import duty on coffee is one hundred and forty pesetas per one hundred kilogrammes (£2 16s 11d per cwt) from all countries excep- from the Spanish island of Fenando Po, and Spain's supply last year came largely from Valparaiso and other South American ports. Coffee from Fernando Po pays a duty of 105 pesetas per one hundred kilogrammes (£2 2s 8½d per cwt). If coffee can be successfully cultivated in the province of Malaga, it is believed that it will be generally grown throughout Andalusia.—*Journa of the Society of Arts*, for August 23.

PRODUCE, PLANTING, AND COMMERCIAL NOTES.

TEA AND COFFEE.

The "Morning Post," in a long article on "Vegetable Food Products," discusses tea and coffee, and its remarks, especially about the former, should serve to increase the popularity of tea with its readers. After referring to the prejudice against tea on its introduction to these isles, the "Post" says: "Thus in 1678 Mr Henry Savile, writing to his uncle, Mr Secretary Coventry, blames the conduct of certain friends of his 'who call for tea instead of pipes and bottles after dinner, a base unworthy Indian practice, which I must ever admire your most Christian family for not admitting. Even as late as 1756 Jonas Hanway, in his 'Essay on Tea,' ventured to assert that 'What Shakespeare ascribes to the concealment of love is in this age more frequently occasioned by the use of tea. However, these were but stray voices in a widening chorus of praise, and when the East India Company's monopoly terminated in 1834, tea, which had then become a necessary luxury, was soon re, garded as a necessity even by the labouring classes. The notable fact that all substances, wherever found which contain the alkaloid 'theine'—it is the characteristic constituent not only of tea but also of coffee, the mate and guarana of South America and the kola of Central Africa—are highly prized by the human race, would seem to prove that this alkaloid, the chemical formula for which is $C_8 H_{10} N_4 O_2$, satisfies some common craving of all sorts and colours of men. But doctors disagree as to what precisely craving may be and as to how and why it is satisfied by the drinkingof tea or coffee.

TEA DUST.

The "Financial Times" publishes a letter from a correspondent signing himself "Pussellawa," who says: "May I suggest we all agree to burn our tea dust? On my estate it represents three per cent of production. This withdrawal would afford some little relief, and some of the objections of your correspondent be met. As I am addressing, I presume, practical tea planters, it is needless to occupy your space with details." Upon which our contemporary says: "The idea is an ingenious one, but we fear it is impracticable. The same suggestion was thrown out timidly some six months ago when the tea interests were in consultation, but it failed to receive support. Each man was willing that his neighbour should burn his tea dust, but failed to see why he should do so himself, seeing that it commands a substantial value in the market. As a matter of fact, the course of Nature is solving the tea problem, the present short season restoring the average as against the two previous superabundant seasons. What is now concerning tea growers is how further expansion of estates may be prevented rather than how the output may be restricted."

It is possible that the leaves of the coffee tree will one day become marketable in the Lane. A chemica analysis shows that the leaf contains all the characteristic properties of the berry, but is richer in the in. The natives of Sumatra make a drink from these leaves, and the editor of the "Queensland Agricultural Journal," who, presumably, has tried it on his own account, declares the coffee-leaf tea to be a pleasant and refreshing beverage.—*H. and C. Mail*, Aug. 30.

TEA AT SALE PRICES, PLUS 5 PER CENT.

The following advertisement in the latest *Grocer*—referred to yesterday in our London Letter—is the outcome of the secret tea sale scheme, and must be rather a thorn in the sides of the dealers who see the cost price, date of purchase and lot number of the tea declared and purchasable at an advance of five per cent:

The Market Prices Company, Tea Brokers and Clearing Agents, 72, Mark Lane, London, E.C.

The undernoted teas have been purchased in this week's public sale, and are offered at public sale cost. On market terms.

Purchasers can have 6 chests or 6 ½-chests of any lot. It is only necessary to wire lot number when ordering.

Samples will be sent free of cost on application. [Here come half-a-dozen lines in Assams, brought on Monday, the 12th August; and the announcement then proceeds:—

CEYLON TEA (BOUGHT TUESDAY, 13TH AUG. 1901.)

			Mark	Price.	Lot. No.
23	Chests	Pek. souchong	Peacock Hill	4½	94
23	do.	Pekoe	Landerdale	4¾	95
27	do.	Pekoe	Dartry	6	96
49	do.	Broken pekoe	Dartry	6½	97
19	do.	Pekoe souchong	Lauderdale	4	98
20	do.	Pekoe souchong	Iugurugalla	4½	99
24	do.	Pekoe	Ingurugalla	5	100
14	do.	Pekoe	Mahagastota	6½	101
16	do.	Pekoe souchong	Polatagama	4½	102
6	do.	Pekoe souchong	Dartry	4¾	103
22	do.	Broken or pekoe	Tangakelly	11½	104
25	½ do.	Broken or pekoe	Onvahkellie	10½	105

The above prices are subject to our commission of 5 per cent. only.

No charge for paying duty, clearing, or samples.

Market terms: A deposit of £1 per chest payable at purchase.

The remainder of the purchase-money to be paid on clearance or prompt day.

Discount allowed to prompt day at the rate of 5 per cent per annum.

GATHERING CLOVES.—The clove tree grows to from 40 feet to 50 feet high, with large oblong leaves and crimson flowers at the end of small branches in clusters of from ten to twenty. The cloves are at first white, then light green, and at the time of gathering bright red. Pieces of white cloth are spread under the trees at harvesting time, and the branches are beaten gently with bamboo sticks until the cloves drop. They are dried in the sun, being tossed about daily till they attain the rich dark colour which proclaims them ready for shipment. A clove tree begins to bear at the age of about ten years, and continues until it reaches the age of seventy-five years.—*Journal of Horticulture*, Aug. 29.

Correspondence.

To the Editor.

THE TEA CESS.

Sept. 1.

DEAR SIR,—The Indian Tea Association have declared that the Cess will not be handed over to themselves but to a special Committee. It is to be hoped that this Committee will have funds sufficient for the purpose, or they will come in for much of the style of criticism dealt out to Mr. Mackenzie. It will be a thankless task; the problem they will have to tackle is to renovate the Indian Tea Industry with 4 lakhs of rupees or perhaps only 2½ lakhs according to the rate, ¼ or ½ pie per pound, fixed on. I have sent a circular proposing a 2-pie Cess, to be printed and sent to all the local Associations and to the London Association, and will ask you to print a copy of it in your paper. I can see no reason for doubting that the majority of proprietors can be persuaded into asking for a Cess of 2 pies per pound. I have carefully watched all the tea news, and it will be observed that proprietors *do* respond to any scheme which seems to be capable of ending the crisis but I have never seen that any attempt has been made to canvas for votes.

The Indian Tea Association proposed a Cess over 6 months ago, and it is *now* being taken notice of, and would have been long ago, but for the want of some organisation to collect votes. Refusal is anticipated, but when the matter comes to "yes" or "no," there is no room for doubt, and many will assent who were supposed to be against the measure.

The chief fact that I keep in view now is that there is a spirit of "union" amongst both Producers and Buyers. The million pounds sterling Scheme and the Secret Sale Scheme show that those interested are aware of the actual necessity for combined action. There is a tendency to drop all endeavour to attain to universal combination, and to enter into Schemes for personal safety. If the Cess scheme is abandoned those who have money will no longer drag along the rest with them, but with a sufficient Cess *all* can advance together; there is ample room still for our tea in the world, and I firmly believe that the majority will decide for combined action if the matter can be placed clearly before them and if they are forced to give a vote by a certain date.

Who was the promoter of your Ceylon Cess? How long did it take for the idea to become "law?" Was there much hope of success when the idea was first proposed? Ceylon is compact, whereas India is scattered and it is more difficult to bring about assent to any common measure, but the crisis is more severe now than at the time you *succeeded* in getting a Cess. Necessity is the mother of invention, and so there is hope for my invention. But for the short yield this year, both from India and Ceylon I believe that the two pie Cess which I have advocated since April would now be receiving more support. When in Calcutta, I called on the Head of one of the firms who are Agents for large Companies. I was given to understand that they were more or less content with affairs as they stood, that their gardens were paying, and that their people at Home were not keen on the Cess; but I find one of these "people at Home" spoke distinctly in favour of large measures at the London meeting of July 17th, a date very shortly after that of my interview. If I had had the resolutions expressed at that meeting, I might have received a different answer from the Calcutta Head of the Firm. (I mention this as a reason why I really expect that the two-pie Cess may be adopted.) Again Messrs. Andrew Yule & Co., have taken up the Indian supply business, and it would surely help them greatly if Tea and money were available from a general fund. I have looked through the Tea Directory and find that Ceylon is chiefly composed of private owners, but India is practically all "Companies." It ought to have been easier to get the consent of Indian Producers, and I reckon that the reason why Ceylon got the Cess by general consent, so much sooner than India, is because the small Proprietors had come to the end of their tether and were forced to submit to a general endeavour. But the past few years have been so disastrous to many Indian Companies (who practically benefited by the action of Ceylon) that common measures are now *urgent* to them.

I cannot believe that a small Cess will remedy our disease, and so I urge a larger Cess and the fulfilment of the promise made only six months ago to withdraw 10 millions of Indian Tea from our markets If Indian Proprietors will consent, Ceylon will join. I now appeal to your Planters for one man who will give his heart and soul to obtaining a Cess of two pies per pound at least. We want a big fund worked by Experts; in the letter by "One of the New Order" in yours of August 20th, he says:

"The Committee is composed of the best men in Ceylon, but they are likewise the busiest and cannot spare time to go into details. So I think they should appoint a managing Secretary to devote his *whole* time to the collecting of information as to how and where funds have been spent."

If one man could be *appointed* to collect information as to the public opinion about the rate of the Cess, I feel sure that it would reveal a strong current of opinion towards general combination, provided the scheme proposed is *sufficient.* I put it before you that a Cess of ¼ or ½ pie per pound is *not* sufficient, and that is proved by the experience gained from your Ceylon Cess and the voluntary subscriptions from Indian growers. It is not possible to say decidedly that a Cess of 2 pies will effect the desired improvement in our affairs, and the proposal of one million pounds capital for a Syndicate to control the market shows that some men would consider this insufficient; so it stands to reason that there are opinions varying from doing nothing, up to subscribing 150 lakhs of rupees, and all we have to do is to get some to go up and others to come down to a *general level.*

In yours of 14th August you are good enough to say that my explanation is lucid and satisfactory, except that the reserved tea will be kept by the producers until wired for. "Hitherto we understood that the tea was to be ready on the spot to meet the demand." I beg that you will lay no stress on the details of my Scheme. All details are subject to circumstances. All that we want is a *sufficient* fund subscribed to by *all* producers and a promise of tea *when* required. I suggested that, instead of storing the tea in one room, which would require enormous premises, the tea should be left with each producer *until* required. The only delay would thus

occur on the journey down to Calcutta (or Colombo) and the second instalment could be wired for and bulked immediately after the despatch of the first. There would thus always be tea *at hand*, without the expense or risk of storing the whole reserve. I rather regret having made any suggestions beyond the essentials of the Scheme, to have a sufficient fund and a reserve of tea. At present the Scheme most likely to be adopted is a Cess of from $\frac{1}{4}$ to $\frac{1}{2}$ pie, *i.e.*, a fund of 2 to 4 lakhs of rupees and no tea in reserve.

My Scheme is a fund of 20 lakhs from India and 15 or so from Ceylon and a reserve of 10 and 7 million lb. of tea and a special Board of Control. The largest Scheme proposed is of 150 lakhs of rupees as a fund and an unlimited reserve of tea. We have certainly a large choice of schemes. A. COOKE.

RUBBER-GROWING ON A SEWAGE FARM IN BURMA.

Rangoon, Sept. 5.

(*The Editor, "Tropical Agriculturist."*)

DEAR SIR,—I send you today some papers giving an account of experiments conducted here with a view to utilising sewage in the raising of a crop other than a foodstuff—the outcome of a strong local agitation against the methods of the Chinese market gardeners—a successful but unsavoury cultivator, whose energies, it is thought, might be better employed in other directions.

An article on the *Castilloa tunu* and *hule* as rubber-yielding plants (you may remember our correspondence on this question of last October) has appeared in the new Parisian journal "d'Agriculture Tropicale," with a note on the subject from your correspondent, M. Godefroy Lebeuf. I enclose a translation if you care to insert it in your paper. The question is an interesting one, and seems now in a fair way to a solution.

I hope, before leaving Burma finally, to see something done towards the introduction of *Castilloa* on a larger scale. The climate of Rangoon is much more suited to it than to *Hevea*, but Burma is fortunate in the possession of climates suited to all species of rubber-yielding plants, and of a goodly number of indigenous varieties as well. We have some guttas and pseudo-guttas to which attention has deservedly been drawn of late. There is no reason why the province should not become a great caoutchouc-yielding country in time.—Yours faithfully,

J. A. WYLLIE.

[We are much obliged to Major Wyllie (Indian Staff Corps, &c.) for the useful and interesting papers he sends us, which will appear in full, in due course, in our monthly *Tropical Agriculturist*. A plan is given of the "Kambe Rubber and Sewage Farm" which can be seen at our office by any one interested, and it seems to indicate land very much like that found in the low-lying suburbs of Colombo. There are fields alongside the Kelani Valley railway which might well be utilized as a "Rubber Garden and Sewage Farm" after the example set in Burma.—ED. *T.A.*]

TOBACCO-GROWING IN CEYLON AND B. N. BORNEO.

Kandy, Sept. 7.

DEAR SIR,—Your foot-note to my letter of 5th (see page 256) scarcely does justice to my side of the argument *re* Cultivation of Tobacco wrapper leaf in Ceylon and British North Borneo.

Mr. Vollar was successful in his tobacco wrapper leaf cultivation, because he was first in the field and his leaf was purchased locally, mostly by three tobacco experts from Sumatra who at first starting were deceived by the apparently good quality as far as work of leaf was concerned. They found out their mistake when they sold the stuff in the European tobacco market. Mr. Vollar also made money by the manufacture of leaf for others who however dropped very heavily when they sold the made leaf.

Mr. Vollar, like the wise man he is, pocketed what he made and gave up tobacco wrapper leaf cultivation. The others also gave up the cultivation without pocketing any money.

I grant that there may be risks attending the transfer of men with limited capital or unlimited for that matter to countries belonging to other Governments than British, but *British* North Borneo is *British*.—Yours faithfully, W. D. G.

[It is quite news to us that Mr. Vollar's famous crop of wrapper leaf tobacco was sold by him locally and not in Europe, and we thank our correspondent for his fuller information.—ED. *T.A.*]

COCONUT PALMS AND ENEMIES.

Colombo, Sept. 9.

DEAR SIR,—I send you some leaves off coconut plants on a new plantation along the Kelani Valley line. They are affected with what is evidently a parasitic disease which, however, is localized. The natives attribute it to the "evil eye" and state they have not seen it before in those parts, but the leaves of the young plants are being freely attacked by it. It would be interesting to know what the parasite is and what would prevent its further devastations.—Yours faithfully,

X.

P.S.—In the specimen sent the cocoon-like structures on the back of the leaf may be distinctly seen. [We have sent the leaves on to Peradeniya for examination by Mr. Carruthers.—ED. *T.A.*]

COCONUT PALMS AND ENEMIES.

Sept. 11.

DEAR SIR,—With reference to the letter "Coconut Palms and Enemies" (see above), the leaves have been attacked by caterpillars of some small moth. The symptoms lead me to believe that the pest is the same that has given so much trouble in the Batticaloa district from time to time, (vide Annual Report R. B Gardens, 1900, p. H7, first para of Entomologist's Report). But as the insects had deserted the leaves submitted to me, I cannot definitely determine it. I should be glad of further specimens, with the living caterpillars, sent in a closed box,

Meanwhile all affected fronds should be at once destroyed. If the plants are young, the caterpillars and their webs can be stripped off by hand. If taken in time it should be possible to stamp out the pest, (see directions in above-mentioned report).—Yours truly,

E. ERNEST GREEN,
Government Entomologist.

[We quote the important paragraph referred to as follows :—

"A tour through the Badulla and Passara districts and across country to Batticaloa was undertaken in April, occupying sixteen days. The main object of the tour was to study a caterpillar pest that was seriously affecting the coconut palms in the neighbourhood of Batticaloa. On badly attacked estates the fronds of the palms were being completely skeletonized. A few trees are killed outright ; but this is exceptional. I was informed thet they usually recover from the attack, but that their bearing capacity is seriously diminished for several years. It was found, as expected, that the properties that were suffering most severely were those on which no efforts had been made to check the pest, or on which unsuitable methods had been employed. On estates where prompt and intelligent action had been taken from the commencement of the attack, comparatively little damage was incurred. The only course to adopt is to watch for the earliest signs of the pest, which are quite easily detected, and immediately to cut off and burn the affected fronds. It is useless to wait until the leaves have been killed before removing them. By that time the caterpillars will have deserted such fronds and migrated to fresh ones. The insect responsible for all this damage is the caterpillar of a small moth belonging the family *Gelechiidœ*. The species appears to be undescribed, but specimens have been sent to England for determination. The caterpillar may be recognized by the black head and second segment, the hinder parts being of a pale yellowish tint. It conceals itself beneath galleries composed of silk and sawdust-like pellets of excrementitious matter. The resulting moth is of a pale gray colour with minute black specks on the front wings. It measures about one inch in expanse."

it is for our coconut-owning correspondent now to respond promptly to Mr. Green's request for further specimens.—ED. *T.A.*]

PLANTING NOTES.

THE PEARL FISHERIES of the Gulf of California are let out as a concession by the Mexican Government, and are said to be very valuable. The shells of the pearl oyster are shipped to Europe and sell for from 16 cents to 18 cents a pound. The gross earnings of the fisheries are estimated at $200,000 per annum.—*Financial News.*

LEMON JELLY.—Rub the yellow rind of three large lemons upon ½ lb. sugar, pour over it the strained juice of six lemons, and put it into an enamelled pan with 1 oz. isinglass, 1 pint of water and a glass of sherry. Stir these over the fire until the isinglass is dissolved, strain the jelly through a bag, and if not perfectly transparent mix it when cool with the whites and crushed shells of three eggs with a ¼ pint of cold water. Let the jelly boil for three minutes without stirring, then let it settle for five or six minutes, and strain it again. Set it in dishes or in small jelly glasses.—*Journal of Horticulture,* Aug. 29.

ROYAL BOTANIC GARDENS, KEW.—Bulletin of Miscellaneous Information. Contents :—Jarrah and Karri, Maromba Vine Disease in Portugal, Chinese Printing Blocks, Lungan Pulp, and Miscellaneous Notes.

WHY WE PRUNE.—First, to modify the vigour of the plant ; second, to produce larger and better fruit ; third to keep the tree within manageable shape and limits ; fourth, to change the habit of the tree from fruit to wood production , or *vice versa* ; fifth, to remove surplus or injured parts ; sixth, to facilitate harvesting and spraying ; seventh, to facilitate tillage ; eighth, to train plants to some desired form —*Journal of Horticulture,* Aug. 29.

"ARE THE TROPICS DOOMED ?"—is the heading of an editorial in which a foreign contemporary discusses the manner in which the tropical production of various articles of commerce are being ousted from the markets of the world by the scientific discoveries of the age, both in the laboratory and the field. The writer instances cinchona, indigo, and sugar as cases in which the tropical industries appear to be falling to the ground in the face of the manufacture of the article in temperate countries. But we suspect it will be a long time before tropical sugar and cinchona or even Bengal Indigo planters become extinct ? Perhaps the date may be simultaneous with the year when the Russian Caucasus and American Southern States produce enough tea for the requirements of Russia and the United States respectively !

THE COFFEE CROP IN COORG.—An estimate of the coffee crop in Coorg for 1901 has been received in Calcutta from the local Administration, and the figures are appended, with the estimates of 1900, for comparison :—

	1900. tons.	1901. tons.
Estimated yield (2 cwt. an acre for Europeans in 1900 and 1½ cwt. in 1901) ..	2,751	1,988
Estimated yield (½ cwt. an acre for nativee in 1900 and ⅓ cwt. in 1901) ..	1,120	701
Total ..	3,871	2,689
Estimated average yield per acre of ordinarily well cultivated coffee in full bearing	2¾ cwt.	2 cwt.
Export of coffee taken from the toll gate returns ..	2,366 tons	3,665 tons
Average annual export of coffee in the ten preceding years ..	3,326 tons	3,358 tons

Taking the average crop to be about 4,56C tons, the estimate of 2,689 tons for the present season represents about 59 per cent. of the average against 76 per cent. in 1900.

Poor old coffee is gradually going down in Coorg, as in Mysore, and everywhere in India ; and yet we know that Coorg planters have, of late years, been importing coffee seed from Uva, Ceylon.

THE DEAF HEAR.—No. 479 of *The Illustrated World* of 626, Chiswick High Road, London, W., England, contains a description of a Remarkable Cure for Deafness and Head Noises which may be carried out at the patient's home, and which is said to be a certain cure. This number will be sent free to any deaf persons sending their address to the Editor.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	—	865	—
Ceylon Tea and Coconut Estates	500	—	—	..
Castlereagh Tea Co., Ltd.	100	70	75	...
Ceylon Povincial Estates Co. Ltd.	500	500	..	—
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	40	05	—
Clyde Estates Co., Ltd.	100	—	—	—
Doomoo Tea Co., of Ceylon Ltd.	100	60	65	—
Drayton Estate Co., Ltd.	100	...	...	...
Eila Tea Co., of Ceylon, Ltd.	100	—	30	..
Estates Co of Uva, Ltd.	500	..	250	—
Gangawatta	500	—	—	..
Glasgow Estate Co., Ltd.	500	900	—	—
Great Western Tea Co., Ltd.	500	610	—	—
Hapugabalande Tea Estate Co.	200	—	—	..
High Forests Estates Co., Ltd	500	...	550	..
Do part paid	400	—	450	—
Horekelly Estates Co., Ltd.	100	60	..	—
Kalutara Co., Ltd.	500	—	250	—
Kandyan Hills Co., Ltd.	100	—	40	—
Kanapediwatte Ltd.	100	—	85	—
Kelani Tea Garden Co., Ltd.	100	20	25	—
Kirklees Estates Co., Ltd.	100	—	120	...
Knavesmire Estates Co., Ltd.	100	—	60	—
Maha Uva Estates Co., Ltd	500	—	400	—
Mocha Tea Co., of Ceylon, Ltd.	500	675	—	—
Nahavilla Estate Co., Ltd.	500	—	300	...
Neboda Tea., Co. Ltd	500	..	500	—
Nyassaland Coffee Co. Ltd	100	—	—	—
Palmerston Tea Co., Ltd.	500	...	—	—
Penrhos Estates Co., Ltd.	100	—	90	—
Pitakanda Tea Company	500	—	—	—
Pine Hill Estate Co., Ltd.	60	—	37·50	—
Putupaula Tea Co., Ltd.	100	—	—	—
Ratwatte Cocoa Co., Ltd.	500	—	250	—
Rayigam Tea Co. Ltd.	100	—	40	...
Roeberry Tea Co., Ltd.	100	—	67½	—
Ruanwella Tea Co., Ltd.	100	20	—	..
St. Helier's Tea Co., Ltd.	500	—	500	...
Talgaswela Tea Co., Ltd.	100	—	35	...
Do 7 per cent Prefs.	100	..	70	...
Tonacombe Estate Co., Ltd.	500	..	325	...
Udugama Tea & Timber Co., Ltd.	50	..	..	..
Union Estate Co., Ltd.	500	...	200	...
Upper Maskeliya Estates Co. Ltd.	500	—	—	..
Uvakellie Tea Co., of Ceylon, Ltd.	100	56	—	—
Vogan Tea Co., Ltd.	100	—	50	—
WanarajahTea Co.,Ltd.	500	..	1000	—
Yataderiya Tea Co., Ltd.	100	—	220	—

Ceylon Commercial Companies.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	...	30	—
Bristol Hotel Co., Ltd.	100	..	115	—
Do 7 per cent Debts.	100	105	—	—
Ceylon Gen. Steam Navgtn. Co., Ltd.	100	222·50	225	—
Ceylon Superaeration Ltd.	100	—	70	—
Colombo Apothecaries' Co. Ltd.	100	...	137½	..
Colombo Assembly Rooms Co., Ltd.	20	15	..	...
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	—	85	—
Colombo Hotels Company	100	295	300	—
Galle Face Hotel Co., Ltd.	100	162·50	...	163·25
Kandy Hotels Co., Ltd.	100	...	117·50	..
Mount Lavinia Hotel Co., Ltd.	500	...	..	250
New Colombo Ice Co., Ltd.	100	...	190	..
Nuwara Eliya Hotels Co., Ltd.	30	30	..	..
Do 7 per cent prefs.	100	107	110	...
Public Hall Co., Ltd.	20	12½	14	...

LONDON COMPANIES.*

Company	paid p. sh.	Buyers.	Sellers.	Transaction
Alliance Tea Co., of Ceylon, Ltd.	10	...	8—9	..
Anglo-Ceylon General Estates Co.	100	..	45—55	..
Associated Estates Co., of Ceylon	10	—	1—3	...
Do. 6 per cent prefs.	10	..	4—6	..
Ceylon Proprietary Co.	1	...	¼—½	..
Ceylon Tea Plantation Co., Ltd.	10	—	24—25	..
Dimbula Valley Co., Ltd.	5	—	5—5½	..
Do prefs.	5	..	5—6	...
Eastern Produce & Estates Co. Ltd.	5	...	3½—4½	..
Ederapolla Tea Co., Ltd.	10	...	6—8	...
Imperial Tea Estates Co., Ltd.	10	...	3½—4½	..
Kelani Valley Tea Asscn., Ltd.	5	..	3—5	...
Kintyre Estates Co., Ltd.	10	...	6—8	..
Lanka Plantation Co., Ltd.	10	..	3½—4½	..
Nahalma Estates Co.,Ltd.	1	—	nom	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	9¾	10	10
Ouvah Coffee Co., Ltd.	10	..	6—7	...
Ragalla Tea Estates Co., Ltd.	10	..	12	..
Scottish Coylon Tea Co.,Ltd.	10	—	12—15	...
Spring Valley Tea Co., Ltd.	10	...	2—4	..
Standard Tea Co., Ltd.	6	10½	10—11	...
The Shell Transport and Trading Company, Ltd.	1	.	2⅞—3⅛	..
Ukuwella Estates Co., Ltd.	25	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	...	4½—5	...
Do. pref. 6 o/o	10	...	9—10	..

BY ORDER OF THE COMMITTEE

Colombo, September 27th 1901.

* Latest London Prices

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1896.	1897.	1898.	1899.	1900	Av of 31yrs.	1901
	Inch	Inch	Inch	Inch.	Inch.	Inch.	Inch
January ..	2·92	3·81	2·32	6·98	3·72	3·24	11·91
February ..	0·35	1·68	1·98	2·78	0·63	1·89	3·55
March ..	5·64	3·66	4·21	0·88	3·71	4·75	5 12
April ..	5·93	10·97	22·81	6·66	15·12	11·43	8·71
May ..	9·31	8·30	5·80	17·73	10·63	12·04	6·28
June ..	8·37	10·14	10·94	9·23	7·83	8·35	5·93
July	2·85	5·24	6·15	1·11	6·77	4·30	4·52
August ..	6·35	9·09	0·97	0·62	7·35	3·79	0·46
September	10·99	4·58	6·90	1·48	4·00	4·98	3·12*
October ..	16·78	4·71	20·60	12 99	9·47	14·36	
November..	19.81	11·66	17·38	8·58	9·25	12·55	
December..	11·76	8·89	3-05	4·44	5·20	6·35	
Total..	101·06	82·73	103·11	73·48	83·68	88·03	49·60

* From 1st to 25th Sept. 3·12 inch, that is up to 9·30 a.m. on the 6th ept.—Ed. *C.O.*

Elephant in Southern Abyssinia.—Captain Wellby (says the *Spectator*, Aug. 3, in reviewing the new book of this gallant traveller who fell lately in South Africa) talks with the greatest equanimity of walking into a herd of elephants and shooting right and left. According to him a charging elephant, and still more easily, a charging rhinoceros can be evaded by a step aside. It is pleasant to say that he shot with discretion and humanity, and not for a record bag; though his first encounter with elephants was disastrous as he fired at the head three times with a rifle or cartridges deficient in power to penetrate. When he had secured as much ivory as his men could carry without inconvenience, he let the elephants alone and watched instead of shooting them. It will be surprising if the reading of this book does not tempt many big-game shots to make the journey to the shores of Lake Rudolf. If they go, it is to be hoped that they will bring back more detailed information about the tribes. For example, the Turkanas are described as a race of giants but we have no measurements given.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS

Colombo, Sept 23rd, 1901.

Cardamoms :—
All round parcel, well bleached per lb. R1·45
Do. dull medium do. R1·30
Special assortment, 0 and 1 only do. R1·80
Seeds do. R1·35

Cinchona Bark :—
Per unit of Sulphate of Quinine 9c—1½ to 3 o/o.

Cinnamon :—
Ordinary assortment per lb. 50c.
Nos. 1 and 2 only per lb. 54c.
Nos. 3 and 4 only per lb. 44c.

Cinnamon Chips :—
Per candy of 560 lb R75·00

Cocoa :—
Finest estate red; unpicked per cwt None }
Medium do do ,, } No quotations.
Bright native unpicked and undried ,, }
Ordinary do do do ,, }

Coconuts—(husked).
Selected per thousand R47·00
Ordinary ,, R40·00
Smalls ,, R30·00

Coconut Cake—
Poonac in robins f. o. b. per ton R75·00
Do in bags None

Coconut (Desiccated).
Assorted all grades per lb 16½c

Coconut Oil—
Dealers' Oil per cwt R16·25.
Coconut Oil in ordinary packages f. o. b. per ton R355·00—Business done

Coffee.—
Plantation Estate Parchment on the spot per bus. None.
Plantation Estate Coffee f.o.b. (ready) per cwt—None.
Native Coffee, f.o.b per cwt.—None.

Citronella Oil—
Ready do per lb.—44c

Copra—
Boat Copra per candy of 560 lb. R55·50
Calpentyn Copra do do R56·00
Cart do do do R53·00
Estate do do do R55·00

Croton Seed per cwt—None

Ebony—
Sound per ton at Govt. depot—R200·00 Per Govt sales of 2nd September.
Inferior R150·00 Per Govt. sales of 2nd September.

Fibres—
Coconut Bristle No. 1 per cwt R12·00
Do ,, 2 ,, None
Do mattress ,, 1 ,, 3·75
Do ,, 2 ,, 2·50
Coir Yarn, Kogalla ,, 1 to 8 15·00
Do Colombo ,, 1 to 8 11·50
Kitool all sizes ,, None
Palmyrah ,, None

Pepper—Black per lb None

Plumbago—
Large lumps per ton R550
Ordinary lumps do 530
Chips do 350 Fine qualities scarce.
Dust do 200
Do (Flying) 120

Sapanwood— per ton None.
Satinwood (ordinary) per cubic ft. 3·10
Do do per cubic ft. None.

Tea—	High Grown Average.	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	63	49	42
Orange Pekoe do	54	45	33
Pekoe do	46	41	31
Pekoe Souchong do	40	36	25
Pekoe Fannings do	35	26	27
Broken mixed—dust, &c	24	23	23

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1900 AND 1901.

COUNTRIES	Black Tea. 1901 lbs.	Black Tea. 1900 lbs	Green Tea. lbs.	Coffee—cwt. Plantation	Coffee—cwt. N'tive	Coffee—cwt. Total.	Cocoa cwts.	C'moms lbs.	Cinnamon Bales lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1901 cwt	Coconut Oil. 1900 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac. cwts.	Coconuts No.	Plumbago. 1901 cwts.	Plumbago. 1900 cwts.	Fibre cwts.
To U K. ..	75753096	82984663	142650	5982	..	5982	28573	188728	48479	177528	161261	168391	15474	7785201	7960	9327542	138915	87165	49676
,, Austria ..	40946	11132	..	..	..	...	45	..	5900	12320	4208	6479	25252	67113	...	..	...	2	..
,, Belgium ...	13866	12455	...	53	..	53	100	6000	49300	98000	3593	1185	47222	381241	49188	176125	14418	27123	17893
,, France ..	202205	199899	...	204	...	204	30	1469	42100	6920	102	..	55311	2240	500	406	286	102	544
,, Germany ..	318202	257638	...	51	..	51	1424	16889	520265	397732	6646	10056	102781	980220	53342	513170	37932	36425	8794
,, Holland ..	15589	2000	...	...	..	..	..	..	16000	86240	..	...	..	52000	..	..	..	912	753
,, Italy ..	9691	5007	...	..	..	..	..	480	92600	62272	3162	..	..	–	...	6542	..	...	14
,, Russia ..	6637484	6283661	...	126	..	126	123	764	..	..	134	..	42494	..	..	..	3713	1004	..
,, Spain ..	...	15130	...	..	...	..	..	..	232300	41800	..	..	...	10370	..	..	...	..	..
,, Sweden ..	37136	52743	..	...	..	..	..	..	...	14200	199	...	3925	6450	..	..	204	105	..
,, Turkey ..	27269	15291	...	...	..	...	...	..	...	...	..	...	...	...	...	...	..	...	..
,, India ..	950541	574192	16124	68	..	68	..	107241	..	.	84791	55594	720	..	...	375200	334	1045	19
,, Australia ..	15223156	11740211	1714	1896	10	1906	193	...	2856	59068	94	83	...	556945	...	..	132	1637	3628
,, America ..	1903887	3502286	455484	155	..	155	1061	2781	209300	26837	11030	44802	1	819424	...	..	120580	108630	1997
,, Africa ..	222904	145240	..	..	..	..	..	896	5000	..	76	...	..	823	..	1292915	...	...	80
,, China ..	2228626	935?52	4853	34	...	34	149	5205	15100	..	914	827	--	74334	..	1200	..	41	..
,, Singapore ..	95955	80899	...	..	..	...	1516	559	7700	..	3056	2427	...	..	...	...	..	...	332
,, Mauritius ..	29376	700	..	20	..	20	...	..	..	..	..	..	...	..	..	...	..	..	..
,, Malta ..	242308	335573	..	--	...	..	..	..	...	..	..	..	..	...	..	..	.	..	..
Total export from 1st Jan. to 23rd Sept 1901	103952237	107148969	620825	8569	10	8599	33214	331012	1684200	979917	279216	289844	293180	10753300	110920	11693100	316514	264191	83725

MARKET RATES FOR OLD AND NEW PRODUCTS

(From Lewis & Peat's Fortnightly Price Current, London, September 4th, 1901.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry	44s a 80s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine .	5½d a 6¼d
BEES' WAX, cwt.		
Zanzibar & Bombay White ,,	Good to fine	£6 a £7 10s
Zanzibar & Bombay Yellow ,,	Fair ,,	£5 10s a £6 10s
Madagascar ,,	Dark to good palish	£6 10s a £6 15s
CAMPHOR, China ,,	Fair average quality	Nominal
Japan ,,	... .	170s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	2s 3d a 2s 4d
	Middling, stalky & lean	1s 5d a 1s 7d
Ceylon.—Mysore ,,	Fair to fine plump ..	1s 5d a 3s 9d
	Seeds .	1s 10d a 2s 4d
,, Tellicherry ,,	Good to fine ..	2s 11d a 3s
	Brownish .	2s 6d
,, Long ,,	Shelly to good ..	3d a 6d
,, Mangalore ,,	Med brown to good bold	2s 3d a 3s 3d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	4d a 4½d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	35s a 45s
CINCHONA BARK.—lb. Ceylon	Ledgeriana Orig. Stem	3d a 5½d
	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	3⅜d a 4¼d
	Renewed	3d a 5¾d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts per lb.	Ordinary to fine quill	9½d a 1s 6d
2nds	,, ,,	8½d a 1s 5d
3rds	,, ,,	8½d a 1s 4d
4ths	,, ,,	8d a 11d
Chips	,, ,,	2½d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	4½d a 9½d
Amboyna ..	Dull to fine	4⅜d a 5½d
Zanzibar and Pemba	Good and fine bright	4d a 4¼d
	Common dull to fair	3¾d a 3 15-16d
Stems ..	Fair	1⅝d
COFFEE Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 117s
	Middling to fine mid ..	70s a 104s
	Low mid. and low grown	
	Smalls	40s a 60s
Native	Good ordinary	30s a 40s
Liberian ,,	Small to bold	30s a 37s 6d
COCOA, Ceylon ,,	Bold to fine bold	72s 6d a 93s
	Medium and fair	60s a 70s
	Native	52s 6d a 62s 6d
COLOMBO ROOT ,,	Middling to good	10s a 20s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£13 10s a £18
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	15s a 20s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	34s
Calicut, Cut A ,,	Good to fine bold	80s a 95s
B & C ,,	Small and medium	40s a 75s
Cochin Rough ,,	Common to fine bold	34s a 41s
	Small and D's	30s a 35s
Japan ,,	Unsplit	36s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	15s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£7 15s
	Bean and Pea size ditto	70s a £9 2s 6d
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	,, ,, red ...	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 58s
Turkey sorts ,,		40s a 45s
Ghatti ,,	Pickings to fine pale ...	12s 6d a 35s
Kurrachee ,,	Good and fine pale ...	52s 6d a 55s
	Reddish to pale selected	30s a 40s
Madras ,,	Dark to fine pale ...	20s a 35s
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	60s a 137s 6d
	Ord. stony and blocky	6s a 25s
KINO ,,	Fine bright	1s 3d a 1s 6d
MYRRH, picked ,,	Fair to fine pale	90s a 107s 6d
Aden sorts ,,	Middling to good	50s a 80s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low. to good pale	18s a 23s
siftings ,,	Slightly foul to fine	16s 6d a 22s
INDIARUBBER, Assam lb	Good to fine	2s a 2s 6d
	Common to foul & mxd.	7d a 1s 6d
Rangoon	Fair to good clean ...	2s a 2s 6d
Borneo	Common to fine	1s a 2s 3d

	QUALITY.	QUOTATION
INDIARUBBER, (Contd)		
Java, Sing. & Penang lb.	Foul to good clean ...	8d a 2s 6d
	Good to fine Ball ...	2s 6d a 3s 2d
	Ordinary to fair Ball ...	1s 10d a 2s 6d
Mozambique ,,	Low sandy Ball ...	1s 3d a 1s 7d
	Sausage, fair to good ..	2s 6d a 2s 11d
	Liver and Livery Ball ..	2s 4d a [illegible]
Nyassaland	Fair to fine ball ...	2s 2d a 3s
Madagascar	Fr to fine pinky & white	2s 6d a 2s 9d
	Fair to good black ..	2s a 2s 6d
	Niggers, low to fine ..	7d a 2s
INDIGO, E.I.	Bengal—	
	Shipping mid to gd violet	3s 8d a 4s 6d
	Consuming mid. to gd.	3s 2d a 3s 6d
	Ordinary to mid.	2s 10d a 3s 1d
	Mid. to good Kurpah	2s a 2s 6d
	Low to ordinary	1s 6d a 1s 10d
	Mid. to good Madras	2s a 2s 10d
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s a 3s
	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, Madras cwt	Dark to fine pale UG	5s a 6s
	Fair Coast	5s
Bombay ,,	Jubblepore	5s a 6s 3d
	Bhimlies	4s 3d a 7s 6d
	Rhajpore, &c.	4s 3d a 6s
Bengal ,,	Calcutta	3s 6d a 5s
NUTMEGS— lb.	64's to 57's	2s 4d a 2s 6d
Bombay & Penang ,,	110's to 65's	1s 1d a 2s 4d
	160's to 130's	6d a 1s
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 17s
NUX VOMICA, Bombay per cwt.	Ordinary to middling	4s a 5s 6d
Madras	Fair to good bold fresh	7s a 10s 6d
	Small ordinary and fair	5s a 6s 6d
OIL OF ANISEED ,,	Fair merchantable	5s
CASSIA ,,	According to analysis	2s a 3s 3d
LEMONGRASS ,,	Good flavour & colour	5d a 5½d
NUTMEG ,,	Dingy to white	1½d a 3d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 6d
CITRONELLE ,,	Bright & good flavour	9½d a 10d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody..	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ..	10s a 14s
	,, wiry Mozambique	10s a 11s
PEPPER—(Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ...	5⅞d a 6⅛d
Singapore ...	Fair	6d
Acheen & W. C. Penang	Dull to fine	5¾d a 6⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	30s a 35s
	Middling to good small	20s a 32s
chips	Dull to fine bright ..	9s a 15s
dust	Ordinary to fine bright	3s 6d a 8s
SAFFLOWER	Good to fine pinky ..	65s a 75s
	Inferior to fair .	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	... ...	5s a £8
Madras, Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth..	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	55s a 57s 6d
SENNA, Tinnevelly lb	Good to fine bold green	4d a 6d
	Fair greenish	3d a 3½d
	Common dark and small	1d a 2½d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's; D's and B's; Small ...	£3 a £5 5s
Mergui ,,	Small to bold ..	£7 10s
Mussel ,,	Small to bold ...	22s a 65s
TAMARINDS, Calcutta... per cwt.	Mid. to fine bl'k not stony	10s a 11s
Madras	Stony and inferior ..	7s 6d a 10s
TORTOISESHELL— Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	18s a 22s 6d
TURMERIC, Bengal cwt.	Fair ...	20s
Madras ,,	Finger fair to fine bold bright	22s a 25s
Do. ,,	Bulbs ...	17s a 18s
Cochin ,,	Finger ...	17s 6d a 18s
	Bulbs ...	7s 6d
VANILLOES— lb.		
Mauritius ... 1sts	Gd. crysallized 8½ a 9 in	14s a 23s
Bourbon ... 2nds	Foxy & reddish 3½ a 8 ,,	13s a 16s 6d
Seychelles 3rds	Lean and inferior ...	8s a 12s
VERMILION lb.	Fine, pure, bright ...	3s 3d
WAX, Japan, squares cwt	Good white hard ...	32s a 33s

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for October :—

Vol. XIII.] OCTOBER, 1901. [No. 4.

OCCASIONAL NOTES.

WRITING to us in connection with reference to the School Garden and Nature Study movement, Mr. John Spencer, Deputy to the Chief of the Bureau of Nature Study (Cornnell University, College of Agriculture) says: —"Your cordial letter of recent date just to hand. I am considering how I may ask a favour with a minimum of trouble to you. The situation is this. During the past early summer, when speaking to any part of our 20,000 Junior Naturalists, I have always held them enrapt when I told them that a knowledge of their work has gone so far round the earth, that when they were fast asleep at midnight, people would be thinking about their midday meal and perhaps at that moment would be talking about them. I am wondering if you have near at hand any English-speaking children who would write me a letter about some common thing in their lives. Such would give great pleasure to our boys and girls. Such a letter would go from school to school and from town to town. Ceylon and your particular town would have an interest for them that it never had before, all because they would conceive they had some friends living there. There would be nothing within their power that young boys and girls would not do in return. Some would be glad to send photographs of scenes connected with their home and school life. With this idea in my mind I leave you to help me in its solution.—Yours cordially, JNO. W. SPENCER.

We have before now recommended the utilising of all kitchen waste (bones, ashes, &c.,) fo garden purposes, and we would again point out the way in which a valuable fertilizer could be prepared by interlayering wood ashes and bones in a cask, covering with a top layer of earth and keeping the whole moist till a complete fertilizer containing nitrogen, phosphoric acid and potash is got. The Editor of the *Cape Colony Agricultural Journal* states in a note referring to this subject that kitchen bones contain about 50 per cent of phosphate of lime and 3 per cent nitrogen ; average wood ashes 7 per cent of potash and 30 per cent lime. One or more casks should always be at hand for the preparation of this valuable fertilizer. The wood ashes used should be fresh and dry, and old accumulations should always be dried, or better still, calcined, so that they may become caustic for acting on the bones. If every village dwelling had some arrangement for collecting household rubbish, the gain to the occupants would be two-fold—clean surroundings and a useful compost for the garden.

In the Year Book of the Department of Agriculture so far back as 1898 we find the following reference to the use of kerosene against the mosquito: For the mosquito, kerosene has proved a very efficient preventive. Applied at the rate of an ounce to fifteen square feet, to the surface of small ponds or stagnant water in which mosquitoes are breeding, it forms a uniform film over the water and destroys all forms of aquatic insects, including the larvæ of the mosquito

and the adult females which come to the surface of the water to deposit their eggs. The application retains its efficiency for several weeks.

A Ceylon man at present travelling in Australia, writing from Perth, says:—"In Western Australia, which is quite a baby colony, what the visitor can never forget is the wild growth. There is not a weed but has its pretty blossom, and in such luxuriance and variety that I would sooner walk through into miles of sand than through a Botanic Garden or a park. No pen can describe the infinite variety of its attractions. There is every colour and every shade of colour from pink to purple and the lightest yellow to orange and deep red. Then there are grasses of exquisite beauty and form, and "everlastings" of all shapes, sizes, and colour some of which I send you."

Mr. Christian Fernando, late of Ceylon, writes from Durban:—"The cold season is past, and the days are warm, sometimes disagreeably so, and the mango trees are in blossom. Perhaps you are not aware that we have mangoes here? Yes, we do, and jak as well, but they are miserable specimens compared with those in Ceylon. The mangoe trees blossom when they are merely saplings 8 to 15 feet, and I have not yet seen a taller specimen. Fancy being able to just reach out your hand and pluck the fruits off the trees. But they are never very long lived, and I believe this peculiar phenomemon is explained by the energy and haste characteristic of stinted vegetation in alien and unfavourable climes to blossom and reproduce their kind ere they die.

"A Native Horticulturist writes to the *Mercury* recommending all fruit-growers to have an apiary as well, but this does not seem to be necessary for a good mango crop, for all the blossoms I saw were largely visited by house-flies and blue bottles, and not by bees. Is this the case with our Ceylon mango blossoms? They are too high up for casual observation. The jak, too, fruits when trees are from 15 to 20 ft. high. The fruits are small, but esteemed a great delicacy by the Indian population, and fetch from 6 to 12 shillings each. (I have seen them priced as much last October.) Of course these fruits with Naartjes (a variety of mandarins) and bananas are only grown in the coast districts. From all I can gather there is much scope for Horticulture in Natal, if a convenient market could be found. If a direct line of steamers started running between Natal and London for conveying produce, just as has been done between England and the West Indies, there would be a deal of money to be made from fruit culture."

A local vine growers, who is experimentally growing grapes imported from Australia, and is studying the requirements of the plants in its altered surroundings, decided to train his vines *espalier* fashion, as he expects that that will give better control over the training and pruning than if the vines were allowed to run over a framework or pandal.

We would draw special attention to the advertisement of "Gardener" on our back cover. The mixing and preparation of an insecticide according to a standard recipé is, we must confess, a most troublesome and tedious business, and we suppose one reason why amateur gardeners do not take measures against the infestation of their gardens by pests of various sorts, (as evidenced by rose trees with their leaves all eaten away, ferns covered with scale insects, brinjals affected with "soot," and tomatoes drooping and dying owing to fungoid disease) is that they shirk the preparation of the "remedies." "Gardener" now offers ready-made preparations which have only to be diluted with water in the required proportion, according to the directions that will be given.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF SEPTEMBER, 1901.

1	Sunday	·01	17	Tuesday	1·62
2	Monday	Nil	18	Wednesday	·21
3	Tuesday	·06	19	Thursday	Nil
4	Wednesday	Nil	20	Friday	·02
5	Thursday	Nil	21	Saturday	Nil
6	Friday	Nil	22	Sunday	Nil
7	Saturday	Nil	23	Monday	·10
8	Sunday	Nil	24	Tuesday	·02
9	Monday	Nil	25	Wednesday	·09
10	Tuesday	Nil	26	Thursday	·23
11	Wednesday	Nil	27	Friday	·03
12	Thursday	Nil	28	Saturday	Nil
13	Friday	Nil	29	Sunday	Nil
14	Saturday	Nil	30	Monday	·02
15	Sunday	Nil	31	Tuesday	·72
16	Monday	·04	1		——

Total.. 3·16
Mean.. ·10

Greatest amount of rainfall registered in 24 hours on the 17th Sept. 1·62 inches.

Recorded by C. DRIEBERG.

MAINTENANCE OF SOIL FERTILITY.

The triumph of successful agriculture, as a contemporary truly remarks, is the growing of good crops continually over a series of years, and yet keeping up the fertility of the soil. As long as there is fresh land to cultivate there is little need for the use of fertilizers, but with changed conditions cultivators have begun to understand the necessity of keeping the soil that has given returns for any length of time without added fertility. It is an axiom of agricultural science that land should be compensated for what is removed from it by the use of manures and by growing rotations of crops differing in their requirements.

The more common form of manure consists either of animal excreta or decomposed animal or vegetable matter of any kind. In view of the fact that cattle are not housed in the same wayyas in England, a great proportion of the manure ielded by them is lost to the cultivator. Under such circumstances the greatest care must be taken of

what can be saved, and it is utilised to thebest advantage. At the same time all materials that can be made use of to the benefit of the laud should be impressed into service.

As regards special fertilizers, which co ntain particular substances concentrated generally in comparatively small bulk, though their value is generally admitted, yet owing to their cost in most cases aud the lack of knowledge as to their economical use, they have not come into extended use in the Colonies. Though plants contain various substances which they, for the most part extract from the soil, yet the demands of the crops are supplied mainly by three. These are nitrogen which must be in the form of soluble nitrates or ammonia salts, potash, and phosphoric acid, which must also be in a soluble condition. Unless these materials are in such a state as to supply plants with the necessary amount of food for their developement, they might as well not exist in the soil. Through the absence of one essential ingredient land may be too poor to pay for cultivating, though it may be rich in the other elements of fertility. Thus a piece of land may be very rich in potash and phosphoric acid, yet if wanting in nitrogen it will be practically barren. By the use of special manures such deficiencies when known can be made good, and in the land brought into condition for cultivation. Again, special fertilizers may be said to be necessary for particular crops that extract large proportions of certatn materials from the soil. But to use these fertilizers properly a knowledge botb of the material that is being used and of the requirements of the lands. To apply any ingredient which is already amply provided in the soil will not only be a waste of money, but may actually lessen fertility. Tbe right material must be supplied in the right proportion, and the careful cultivator can always pretty correctly find out what his land requires by making experiments. There is no doubt that in most cases the outlay on special fertilizers (in spite of their cost) will prove a judicious investment,

Again, it must be remembered that manures should be applied in such a manner as to afford the greatest amount of benefit. The practice of leaving manure in heaps for any length of time entails both waste of material and labour as well as irregular fertilising. For fruit trees it is recommended that manure should be applied just before the hot weather sets in, as it will shelter the soil from the sun and furnish plants with food when they most require it. As a general rule, it is not advisable to bury manure too deeply, and it should be distributed as evenly as possible. Artificial or special fertilizers should be applied to the surface and afterwards incorporated with the soil.

We have to acknowledge our indebtedness for many of the ideas in the above to "Alfulta," a familiar contributor on agricultural subjects.

FIRST STEPS IN AGRICULTURE.

First Stage—5th Lesson.

BY A. J. B.

So far I have told you very little about seeds, but a farmer must know all about the seeds he buys or produces. He must be able to judge whether they are living and whether they are such as will produce a good plant. It is also very necessary to be sure that they are not mixed with other seeds, In lesson 1 I explained to you how even useful plants become weeds whenever they grow with a crop which requires all tbe ground for itself. Thus you learned that oats may be looked upon as weeds if they grow up in a wheat field. The farmers on the Darling Downs do all they can to get rid of these "strangers" as they call them, because if they ripen and are harvested with the wheat, the miller will not give such a good price for tbe grain as they would if it were not mixed witb oats. Seeds are very often destroyed by little tiny insects. They bore a hole in them, and eat that little living part which you remember is called the "germ." If the germ is destroyed, the seed cannot grow, and all the farmer's labour and expense will be lost if he is not careful to get good, fresh seed. But how is he to tell whether they are good and fresh? Look for yourselves. Here I have a packet of one kind of seed, and here is another of the same kind. One is very old, the other is quite fresh. Now examiue each lot of seeds carefully, and try to find out which is good, and which is bad. You point out the dusty lot, and say, that is bad? You are quite rigbt, but how do you know that I did not put the dust into that packet? You tbink the seeds in it look duller than those in the other packet, and they feel lighter than the other. Now, without my telling you how to distinguish the bad seed from the good, you yet have done so. You see, therefore, that by makiug use of the intelligence God has given you, you can make a little discovery like this. If, as you grow older, you coutinue to use that intelligence, to keep your eyes and ears open to learn from others who have studied many things belonging to agriculture, you will not fail to be successful farmers. But there is yet another way to tell whether the seeds are bad or good. You noticed the dust? Well, I did not put that dust there. How tben did it make its appearance? Examine a seed carefully. What have you found! Oh! so your sharp eyes have found a tiny hole in several of the seeds. How did the hole get there? Did I make it with a pin? No, it was done by an insect, and now you see that the dust is caused by the insect devouring the germ of the seed, and masticating aud digesting its food. The dust then is composed of the remains of the inside of the seed.

You told me that the seed in one packet felt lighter than the seed in the other. Let us see if that is so, but first we will blow away the dust. Here is a small pair of scales. I place the seeds of one packet in this scale. Now drop tbe others into the empty scale. What happens? You notice that one scale is still resting on the table and the other is raised in the air. That shows you, that although there are exactly the same number of seeds in each packet, yet one lot is lighter than the other, and therefore must have lost something. That omething is the life of the seed—the germ.

I will give you one more proof of the lightness of the bad seed. Here is a cup of water. Throw a dozen grains of the good seed into it. Observe, they have all sunk at once to the bottom. Now throw in the same number of bad seeds into the water. Notice that only a few sink, but most of them float. An experienced farmer or gardener would not take all this trouble with his seeds, because, by merely taking a few in his hand and examining them, he can at once decide whether they are good or bad. And when you are old enough to leave school and begin farming for yourselves, you will soon learn to distinguish the good from the bad.

You have perhaps heard someone say: "Oh! I will save the seed of such and such a flower, because it is so beautiful." Of course, if any plant is allowed to go to seed, the seed may be gathered and saved. But many people, particularly flower gardeners, who do not grow flowers to sell, keep cutting off the flowers to put them on the table, or to give to their friends, until the blooming time is nearly over, and then they allow the very last flowers to go to seed, and this seed they save. When it is sown in the following year, they are very much disappointed to find that they do not get nearly such fine healthy plants, nor such splendid flowers as they did from the original plant; and they wonder why this is so. The reason is very simple. As the plant approaches the end of the season, the flowers are not so strong and large, and when they go to seed, the seed is very small and weakly, because it had not sufficient nourishment supplied to it from the soil by the dying plant. Therefore, bear this in mind: Let the best plants and best flowers produce the seed you wish to save. When a wheat-grower wants to produce a new kind of wheat of which he has only been able to get a few pounds weight, he carefully sows it in rows at proper distances apart, and keeps it nice and clean, and waters and tends it until at last it ripens. Then he goes through it and selects the very finest heads with the best-filled grain, and saves these for next year's crop, and by-and-by, instead of a few pounds weight, he has several thousand bushels of fine wheat. Had wheat-growers kept on growing wheat from their own fields year after year on the same ground, the wheat would gradually have become smaller and the grains fewer and pinched up, till at last it would not have been worth growing. But in all wheat-growing countries, there are people who make it their business to improve the wheat and make it more valuable for food. However, it will be many years before you will understand how this is done, and I merely mention it to you in order to impress upon you the great importance of a careful selection of seeds.

We were talking about holes being bored in seeds by insects, but there are a vast number of holes in the skin of the seed, just as there are, thousands of holes in your own skin. These holes are called "pores," and it is through them that the moisture of your body passes out when you are very much heated. The moisture is "perspiration."

The holes or pores in the seed are there for the purpose of enabling the seed when it has been grown to take in the amount of water required to make it swell and grow. In the dirty seed, these are stopped up and the seed will not grow properly, if at all, for want of water which cannot get in at the closed-up pores. It is precisely the same with your own pores. If you do not keep your skin clean and thus open the pores, the moisture within you which wishes to pass out as perspiration cannot do so, and you will find that you do not feel so healthy and strong as you would if you regularly bathed and washed.

The depths at which to sow seeds depends entirely upon the kind of seeds you are sowing. Some require to be barely covered with a thin layer of fine soft soil, others should be planted at a depth of from ½ an inch to 3 or 4 inches, but this you will learn when you begin to study the methods of sowing and planting adopted in different parts.

Questions on Lesson 5.

1. Why should a farmer be a good judge of seeds?
2. In what way may seeds be destroyed?
3. How are you able to tell whether seeds are good or bad?
4. By what experiments can you determine the weight of seeds?
5. State the wrong and the right methods of saving seeds.
6. How can wheat seed be improved?
7. What are the natural holes in the skin of seeds called?
8. What is the object of these holes?
9. What would happen if the holes are stopped up with dirt?
10. At what depth should seeds be sown?

—*Queensland Agricultural Journal.*

EXTERNAL PARASITES OF POULTRY.

The parasitic infestation of poultry causes far more loss than most breeders imagine. Birds are rarely examined, and the cause of their poor condition is not ascertained or even considered. The evil is allowed to spread unmolested, in many instances it spreads with great rapidity, and a general weak and unhealthy condition results. The chief parasites of poultry are insects, mites, and worms.

These parasites are most injurious to young chicks and "brood" hens. The persistent loss of chicks, and the failure of hens to bring off their young, are often due to the irritation caused by the presence of parasites upon their bodies—enemies that are frequently unsuspected. The insect and mite pests weaken the constitution and predispose to other maladies, such as diptheritic roup and "gapes"; in many cases they have been the forerunner of these worse epizootic diseases. Parasites on the young birds stunt their growth. What is termed "scaly-leg" is due to a parasite—a mite. Another species of

mite at the roots of the quills causes birds to pluck their feathers.

There are three distinct groups of insect and mite pests upon fowls, namely :—(1) Fleas *(Pulicidæ)*; (2) Lice (*Mallophaga*); and (3) Mites (*Acarina*). The two former only are true insects, having the six insect legs ; the *Acarina* have four pairs of legs and are quite distinct from true insects. The fleas and some of the worse mites are armed with a piercing and sucking mouth, the bird lice having biting mouths and thus differ from ticks found on animals. The pests with piercing mouths weaken the birds not only by causing irritation but by actual robbing of blood. The biting lice, on the other hand, only cause severe irritation, which keeps the birds in constant unrest. Most birds have distinct parasites upon them, each species of louse only flourishing on a particular species of bird ; duck lice, for instance, cannot live permanently upon fowls, and *vice versâ.*

Different species also seem partial to particular parts of the bird's body. The favourite positions seem to be the head, neck, rump, and under the wings. Some of these parasites live permanently on their hosts (lice and some mites), whilst others (fleas and some mites) go to and fro. Some *Acari* live entirely upon, and even under, the skin, deep amongst the feathers and at their roots; some lice live like " ticks" with their heads against the skin and their bodies erect; whilst a single genus (*Lipeurus*) lives between the barbs of the feathers. All these parasites are encouraged by dirt.

Fleas (*Pulicidæ*).—The fleas, which are true insects, belong to the order of flies (*Diptera*). They feed upon the blood. One species only lives upon the fowl, namely, the bird-flea (*Pulex gallinæ*), which attacks also most other birds. The hen-flea, as it is generally called, is abundant is dirty fowl runs, and especially in the nests were straw is used. The adult flea is dark in colour, and, as in all fleas, is devoid of wings. The fleas are provided with very sharp piercing mouths. They are what are termed " partial parasites"—parasites that only go to their hosts to feed. The fleas are not noticed on the birds because they generally attack them at night; then, however, they do much harm, causing constant irritation and loss of blood, and depriving them of rest.

Life-history of the Hen-flea.—The female flea lays her eggs (nits) chiefly in the nests amongst dust and dirt and in the crevices of the walls and floor. These nits give rise to pearly white maggots, with brown horny heads, which can often be found in the bottom of the nests among the dust. These larvæ are mature in two or three weeks, when they reach about ⅙ of an inch in length. In warm weather they may be full fed in even ten days. They then spin a pale cocoon amongst the dirt, in which they pupate. The pupa is at first pale brown, then dark chesnut brown. In this condition the flea remains ten or twenty-one days, when the pupa hatches into the adult. They breed all the year round, but chiefly in warm weather. It is well to remember that, whenever there are dark and dirty hen roosts, there are sure to be numbers of *Pulex gallinae*.

(2) *Lice (Mallophaga.)*—The bird lice belong to the group Mallophaga, quite distinct from human lice *(Pediculidae)*, and from mammalian lice *(Haemotopinus, &c.)* These *Mallophaga* have not a piercing mouth ; their mouth is simply used for biting. They subsist upon the productions of the skin and fragments of feathers. They cause violent itching, and bite sharply, and must produce considerable pain when in large numbers, as is too often the case. The feathers, especially the saddle trackle, generally show notched edges with lice infestation. Eight distinct species of lice attack fowls. The presence of these lice (Phthiriases) is generally ascribed to two uniform or insufficient nutrition, or else to damp, dark, and dirty runs, especially those badly ventilated. Food, either when uniform or insufficient has no effect upon their presence. Dark, damp places, however, when dirty, are sure to harbour all these pests, especially when badly ventilated. It is also said that breed affects their presence, but observations tends to show that all breeds are more or less subject to infestation. In every case they set up severe irritation and inflammation of the skin, which often leads to stunted growth, and even death! Lice and other parasites flourish on unhealthy birds.

Life-history of Lice.—All the lice breed fairly rapidly. The eggs or nits are laid upon the down feathers as a rule ; they are often beautifully sculptured objects, oval in form. In about six to ten days they hatch into small, pale, active lice, which at once commence to irritate the birds. The adults are occasionally found in the nests. Some species are found copulating in the nests, others always on the birds. They live a considerable time. *Menopon pallidum* has been kept active for months upon fresh feathers, the quick epidermis being especially eaten. Before reaching the full-grown state, as many as ten to twelve months apparently take place, there being little difference in each stage except the gradual darkening of the markings.

(3.) *Mites* (*Acari, Acariases, Dermanyssus*).—Mites are very minute creatures, having four pairs of legs. Some are partial parasites, living on the birds *at night*, as *Dermanyssus avium*, the common fowl mite; others are permanent parasites, as *Sarcoytes*, living at the base of the feathers, and popularly called "depluming scabbies." Others, again, live under the skin, forming scabby growths, such as are seen on fowls' legs (*Sarcoptes mutans*). These are armed with a pricking mouth, with which they torment the birds, especially at night, causing loss of condition, hindering setting, and creating loss in other ways.

The most injurious form is the red or common fowl mite.

The Fowl Mite (*Dermanyssus avium*).—This very minute creature is yellowish white to dark red in colour, according to the amount of blood it contains, drawn from the birds. They are found in abundance in pigeon-houses and poultry-roosts. Both sexes are armed with a sharp rostrum ; the female is most blood-thirsty. They feed upon the birds only at night, and hide away in cracks and crevices in the nests, perches, floors, walls, and ceilings during the day. Numerous colonies

can be found in the nests free and coupled together, with countless eggs and quantities of exuviæ and young forms, especially in straw nests. They are most prolific, and can remain for months without any food; hence the removal of the birds from the runs is useless as a remedy. The ova hatch rapidly. The young are at first silvery white, with six legs like a true insect. They moult their skin a number of times, the exuviæ or cast skins forming a whitish or silvery powder often seen on the perches. As the mites grow older they become darker in colour. Light and air are distasteful to them; damp, dark, and badly-ventilated roosts are where they flourish best. Breeding is especially rapid in spring and summer. This mite is often unobserved, owing to its strict nocturnal habits, and hence the cause of the fowls keeping backwards, and even dying, is not understood. Birds should, when looking dejected and emaciated, be examined at night, and if mites are found treatment should be at once resorted to. Transmission to man and other animals is not unusual; but, although the mites for a time cause severe irritation, they will not remain for any length of time, and readily yield to treatment. Hens should not roost in stables and sheds where other animals are kept.

Prevention and Treatment of Fleas, Lice, and Mites.—Infestation is always worse in dirty and neglected runs and roots, and such are a standing danger to more cleanly neighbours. Cleanliness and freedom will always put these pests under a disadvantage—not only cleanliness of the nests, walls, and floor, but also of the ceilings and perches. To suppress these pests the houses should be cleaned down at least twice a year with a wash made of hot lime and soft soap, the ceilings, walls, and nests having a good coating; the wash should be fairly liquid, so as to run into every crack and crevice. To every gallon of lime-wash add ¼ lb. of soft soap, previously dissolved in boiling water. Early spring and autumn are the times for these applications. The perches are best treated with boiling water and soft soap, or with an emulsion of kerosene. It is important that houses should be well built, with as few cracks and crevices as possible, for in such harbours these pests congregate and may escape from any wash used. Special attention should be paid to the nests; they should be frequently cleansed and changed to keep off fleas and other parasites. Neither nest-boxes nor perches should be fixed, relays of each should be at hand, so that they can be changed to ensure complete disinfection. The nest-boxes should be now and then cleaned out, and dressed with hot lime. Either dusting the prepared nests with Persian insect powder (*pyrethrum*) or putting a little sawdust or sand soaked in napthaline at the bottom will keep off these depredators. Wood-shavings, or wood wool, in the nests instead of straw is most beneficial. No lice or fleas will live in it owing to the aromatic odour given off from the wood. Care of course must be taken that the remedies employed do not affect the eggs with nest. Regarding the infestation of the birds themselves, white precipitate seldom fails. The heads and necks of young chicks should be early dressed very sparingly and repeated when necessary. White precipitate is a strong irritant poison, and needs the greatest care in the use, especially in young chicks. It is best obtained as an ointment from the chemists. Hens selected for sitting should have a small quantity of this ointment rubbed in under the vent, head and sides, and then well dusted with insect powder (pyrethrum). Sitting hens are greatly tortured by parasites, and their young are often lost by neglect of these simple precautions. Dust baths are the natural remedy for lice and mites, and fowl should never be kept without them, Sand and road dust, mixed with a small quantity of paraffin will generally keep the birds free from vermin. In place of paraffin Pyrethrum powder may be used with the dust.

(*To be concluded.*)

POTTING OF PLANTS.

If new pots are to be used, be sure and seek them for several hours first, for unless the ottery has been wel moistened it will suck out pli moisture from the soil. Old pots are as good and even better than new, but they should be well washed inside and out before using again. Warm soap suds with a table spoonful of washing soda dissolved in it will wash the most soiled pot as clean as a new one. Fresh soil is the best for plants, and that which is obtained from under the stiff, wiry sharp-looking grass is very fine for use. Such tufts when well rotted make the best composts to mix with garden loam, leaf mould, &c. A little sand is needed for nearly all plants as it keeps the soil light and lets the roots extend freely. Leaf mould should be prepared by every gardener by gathering the autumn leaves and piling them in a heap to decay. It is well to throw a little soil over them to prevent them from blowing away. In eighteen months they are ready to use. Thoroughly decayed cow manure is also needful for healthful growth, and that collected in dry cakes in pastures piled up but kept dry for 12 months is exactly to our purpose. Little bits of charcoal and coarse gravel are of great use in preparing compost and potting plants. Put some bits of charcoal into the bottom of the pot, then a little fine straw or moss, and now add an equal mixture of loam leaf mould or cow manure and a sprinkling of sandy gravel. Shake this down well, wet it a little, and put in the plant, spreading out the roots as evenly as possible. Add more compost by degrees, pressing it firmly about the roots; do this till the pot is nearly full. Sprinkle the whole surface of the leaves and shade for two or three days. For repotting give the earth in the pot a good wetting, then run a knife around the edge and spread the fingers of the left hand over the soil, with the other hand turn the pot topsy turvy and a ball of earth will drop into your hand. If it does not fall out directly strike the edge of the pot against some hard substance

and it will drop. Disentangle the fibres of the root at or near bottom, and set the plant firmly into a pot one or two sizes larger with a little charcoal and rich earth at the bottom of it, water well and shade for a few days. Give also a top dressing of fresh soil if needed, and your plants will repay the care. As a general rule pots from 4 in. to 7 in. are large enough. Plants will often flower better if the root is bound a little. This is especially the case with double geraniums. Give careful culture, keep them clean, well-watered, properly ventilated and well-fed, and you will never regret the care expended upon them.

PLANT LIFE.

[A SERIES OF SIMPLE LECTURES INTENDED FOR A CLASS OF JUNIOR STUDENTS.]

Lecture I.

Not long ago you listened to a lecture on Nature Study and School Gardens delivered here by the Director of the Royal Botanic Gardens. Do you think you fully realize the significance and importance of what is called "Nature Study" and the connection between it and School Gardens? Let me see if I can make this matter clear to you. You must not imagine that Nature Study implies anything very new or extraordinary. It is simply the study of nature or natural objects. It consists of closely observing these natural objects so as to clearly understand all about them, and to draw correct conclusions regarding them as the result of such observations.

There are many people who may be said to see and yet not see. That is to say, their eyes are open, but they do not observe or notice what they see. Objects are pictured in their eyes as in a looking-glass, but no impressions or ideas of these pictures are conveyed to the mind. If you have read a description of the structure of the human eye you will know that there is a part of it (the retina) upon which a picture of every object which one sees is cast (look into your neighbour's eyes and you will see your own image), and that there is also a nerve (the optic nerve) which conveys the impression of that picture to the mind. Have you heard of the expression "the mind's eye"? Well, it is with this eye that we must see things in order that we may grasp and retain impressions of them. If we only see things with what we may term "the reflecting or mirror eye," then we see to little effect. It is really the want of a little effort—the want of a little exercise—on the part of the mind that makes people fail to notice and observe what they see. Listless people, who cannot rouse themselves to take an interest in what is around them, are particularly lacking in this respect. They cannot concentrate their minds on any object they are looking at; they keep wandering in their minds, and allow objects to pass before their eyes unnoticed.

Other people again are observant in a degree, but their observation is only superficial and does not take in details. There are others still, but unfortunately not a very large number, who not only take in the details of a picture before their eyes, but they make a point of closely scrutinizing and studying every natural object they come across; and further, they enquire into its structure and functions; in fact, they learn all they can about it, reason about it, and draw conclusions from their study which will probably prove useful to them in a practical way. These are true nature-students, and their method of study is the basis of all science. It is by observing, comparing, and classifying natural objects and phenomena that we are able to lay down certain principles which go to constitute sciences.

But what have School Gardens to do with Nature Study, you will ask? School gardens furnish a field for nature study, and children cultivate a taste for nature study by spending their leisure hours working amid the pleasant surroundings of these gardens. The method of nature study learnt in school gardens can afterwards be applied to natural objects outside them. All natural objects are full of interest, and whether it is a plant, a rock, or a stream, there is a fascination in the study of them, and the minds of the children who study them are enlarged; they find a new interest in life, and a pleasant and profitable way of spending their leisure hours. But I think you will find that the study of plants is particularly interesting and profitable, particularly to children who live in the country. I will mention one reason why plants have a peculiar interest for us, viz., they are like us, that is like animals, living things, and hence different from other natural objects. Of the many sciences which fall within the scope of that vast subject called Natural Science, the study of animals and the study of plants are together known as Biology or the science of life, because the objects they treat about are animate objects or living things, while other sciences deal with inanimate objects such as rocks, stones, soil, rivers, rain, gases, &c. You see, therefore, that animals (like ourselves) and plants, are very closely related in this natural way. You may say that you are not inclined to admit that plants are living things in the sense that human beings are. Well, of life we know very little beyond the fact that it is something distinct from the organism itself, whether plant or animal. These organisms may be said to be the dwellings which the mysterious power called life inhabits. When life is present in the organism we say that it is alive or living, when it is not present we say it is without life or dead. The presence of life is characterised by certain vital phenomena which are never known to exist in inanimate objects or organisms from which life has departed. We all know the characteristics of the living being—the various functions which are carried on by the organs of the living body. Everyone is familiar with the five senses, for instance, taste, touch, hearing, feeling, seeing. But these are not the most important, in that they are not the most characteristic of life, nor are they common to all living things or even to all animals. You must not fancy that all animals are as highly organised as ourselves, for man is the highest of animals. In the study of animals if we begin with man we must descend

gradually lower and lower in the scale of organization through animals like the horse and cow, birds and reptiles, fishes, insects, earthworms, starfish and coral insects until we come to the lowest of animal organisms which are devoid of all organs and even of any definite form, consisting only of a jelly-like mass, such as you may have seen lying on the seashore.

But in the case of all animals, whether of the highest or lowest types, there must be respiration or breathing, nutrition or the sustenance of the body by means of food, as well as growth and reproduction.

Perhaps the most important of these vital functions are respiration and nutrition. You will, I think, readily admit that nothing can be called alive which does not breathe. Why, breathing is the most striking characteristic of life. If we doubt that a man or other animal is alive, we watch closely to see if he breathes, and when he breathes we say he lives.

Then again take nutrition. We all know that no man or animal can live without food, which we say is necessary to sustain life. For the present I will not go into an explanation of how these two vital functions are carried on; it is sufficient for us to recognise that they are necessary to life. I also mentioned growth and reproduction. By growth I mean a certain development through time from the young to the old stage, and by reproduction, a continuation of the species or kind—the begetting of new organisms from the original.

Now inanimate objects such as rocks and stones show none of these phenomena. They do not breathe, they require no food, they do not grow, nor do they reproduce their kind. But plants do all these things—they breathe just as we do, and cannot live in the absence of air; they require food and water as we do, and without nutriment they starve and die; they also grow and reproduce their kind. How all this is done we must gradually learn, and by so doing we shall find a new interest in plants, and by understanding their wants better, we shall be able to care for them better, just as by learning the wants of children we are enabled to bring them up better. C. D.

LIMEWATER FOR EGG PRESERVATION.

The solubility of lime in water to ordinary temperatures is one part in 700 parts of water. Such a solution would be termed saturated limewater. Translated into pounds and gallons this means one lb. of lime is sufficient to saturate 70 gallons of water. However, owing to impurities in commercial lime it is well to use more than is called for in this statement. It may not, however, be necessary if good freshly-burnt quicklime can be obtained to employ as much as was at first recommended, namely, 2 to 3 lb. to 5 gallons of water. With much lime as is here referred to one could rest assured that one lb. to 5 gallons (50 lb.) would be ample, and that the resulting limewater would be thoroughly saturated. The method of preparation is simply to slake the lime with a small quantity of water, and then stir the milk of lime so formed into the 5 gallons of water. After the mixture has been kept well stirred for a few hours it is allowed to settle. The supernatant liquid which is now "saturated" lime water is drawn off and poured over the eggs previously placed in a crock or water-tight barrel. As exposure to the air tends to precipitate the lime (as carbonate) and thus to weaken the solution, the vessel containing the eggs should be kept covered. The air may be excluded by a covering of sweet oil or by sacking upon which a paste of lime is spread. If, after a time there is any noticeable precipitation of the lime, the lime water should be drawn or siphoned off and replaced with a further quantity newly prepared. It is essential that attention be paid to the following points:—(1.) That perfectly fresh eggs only be used. (2.) That the eggs should throughout the whole period of preservation be completely immersed.

Although not necessary to the preservation of the eggs in a sound condition, a temperature of 40° F. to 45° F will no doubt materially assist towards retaining good flavour, or rather in arresting that "stale" flavour so characteristic of packed eggs.

Respecting the addition of salt it must be stated that our experiments—conducted now throughout three seasons—do not show any benefit to be derived therefrom. Indeed salt appears to impart a limy flavour to the egg probably by inducing an interchange of the fluids within and without the egg.

Water glass (sodium silicate) has been extensively experimented with using solutions varying from 2 per cent to 10 per cent. Although in the main the results have been fairly satisfactory, we are of the opinion that lime water is fully its equal, if not its superior as a preservative, and that this latter preservative is both cheaper and pleasanter to use there can be not doubt.—*Live Stock Journal.*

INFLUENCE OF FORESTS ON THE CLIMATIC CONDITIONS OF A COUNTRY.

With regard to the actual decrease of rainfall consequent on the destruction of forests, Major-General Fisher, R.E., an old resident of Bellary and Ramandrag, supplies the most interesting information in the following note:—

"I arrived in the Bellary district in June 1856, and visited the Ramandrag at once; the hills were covered with a good strong jungle; there was a heavy cloud during the night resting on the hills and for the greater part of the day, rainfall during the South-west monsoon constantly and frequently, during the North-east monsoon it was much lighter in the months of March, April and May, the mango showers were usually very heavy and accompanied with much thunder and lightning. The average rainfall we calcutated was then 45 inches in the year; all the springs about the hills ran abundantly throughout the year, and the Nareehulla, the

main feeder of the Daroju tank, with all its tributaries, had water running in them all through the year. The climate of the Drag during the monsoons and the cold weather was quite cold enough to make very necessary, although its elevation is not more than 3,300 feet above the sea-level. The water supply was most abundant during the whole of the hot weather, and the tank was almost always full surplusing very largely during the South-west monsoon.

These observations refer to the years 1856 up to 1864 inclusive, when I left the Bellary district and did not visit the Drag again till January, 1879, I found every thing changed, the jungle has been almost entirely destroyed; the rainfall is most precarious, and certainly not so much as 24 inches in the year; the tank has not filled for the last three years, and is generally 10 or 12 feet below full tank level, the springs are almost free, always dry, dribbling only at the best, the climate is so changed that in the cold water it is hardly necessary to shut the doors and windows, except for the high wind and slight mists of the South-west monsoon, it would not be necessary to close the house at all. The main feeder of the Daroju tank dries up altogether by the end of February, and all its tributaries have no water in them."

Mr. Macartney, the Agent of the Sandar State in the Bellary district, Madras Presidency, also maintains that the rainfall within the last ten years has become lighter and more irregular with the increased destruction of forests by wood cutters and charcoal burners, and indiscriminate grazing of cattle, sheep and goats. Mr. Macartney speaks from an experience extending over 22 years, and supports his observation by the following facts:—

"In the first decade of my residence here, the tank near my house used to be regularly filled every year and to be running over for several weeks at a time. Latterly, though it has accumulated an immense amount of silt, aud is now consequently of diminished capacity, it rarely fills. The same remarks apply equally to the Ramandrag tank and to that of Sigankeni.

The Rushikulya, a river in the Ganjam district, Madras Presidency, is formed by two main branches. One of these coming from the well-wooded hills of Sadara and Pandakol, carries water for nine or ten months in the year, whereas the other, the Mahanadi, taking its rise in the much more open country of Gumsar and Chokapad, is dry for nearly eight months.

A difference of 10 per cent in the average rainfall, combined with a more equal distribution, especially over the drier month, would suffice to bring about the historical changes already noted.

Ebermayer's exhaustive experiments have shown that the mean annual temperature in a closed forest is 10 per cent less than in the open. Iu both cases the measurements were taken at 5 feet from the ground. The difference is greatest in summer, and consequently to us in India of much greater importance than to the inhabitants of more northern latitudes.

That when a much greater part of India was covered with forests the climate of the country was on this account different seems equally indisputable. Fa Hian, the great Chinese traveller in India in the 4th century A.D. says, in describing the country, that its temperature was neither cold nor hot.

This as already stated is corroborated by the ruins of an old civilization in many localities where this could not now exist without the large works of artificial irrigation. It may, I think, be assumed that the same state of things would re-establish itself if a considerable proportion of the country were again brought under dense forests which is physically possible; but that this could be effected to the extent desirable by any measures of the forest conservancy that any Government could uuder existing circumstances apply is out of the question. As this aim cannot therefore in practice be reached, the foregoing paragraphs might be brauded as fanciful and useless, but if it can be accepted that the climate of India would regain its pristine state by a complete afforestation of a large proportion of the country, every step iu that direction must exercise a small advance (however immeasurable) in that direction.

During the earlier period of the present administration shiftiug cultivation (kumti) was practised to a large extent in the central provinces, and several thousands of sugar mills were thereby laid barren year after year.

Early in the seventies this method of cultivation was stopped and extensive growth of young forests sprang upon its place. It is true the whole area is grazed over to a considerable extent and cannot therefore exercise that influeuce which would exert under more favourable conditions, but it would appear that the influence has nevertheless been beneficial.—[*Forestry in British India by B. Ribbenthorp.*]

(*To be concluded.*)

SOIL IMPROVEMENT.

The *Fruit Grower* has some useful remarks on the above subject, and as they are such as cannot be brought too often before the mind of the cultivator, we are inclined to follow the example of our contemporary and dwell on the subject for the benefit of our readers.

It is a common complaint that "land is not what it used to be," or "the soil has greatly deteriorated of late." Now the explanation of this very often is that it is not the soil that is at fault, but that its condition is bad. The importance of perfect conditions of soils is patent when we consider the needs of the seeds or plants whose growth it has to support. Seeds require aerated, warm and moist conditions, and the more perfect these conditions the greater success will attend their germination and development. We often come across soils that are sodden during wet weather and caked during dry, but which nevertheless contain plenty of plant food, and it is the work of the cultivator to treat the soil so that the available plant food may be made fit for ready assimilation of the rootlets of plants and trees.

Soil aeration is an absolute necessity if heavy and healthy crops are to be obtained by cultivation. To ærate the soil we must till it, and this soil turning by various methods lies at the bottom of all improvement.

In fact, *ceteris paribus,* the better aerated the soil the more fruitful will it be. "Air-feeding" of soils is thus of the utmost importance to them and the crops they bear. The *Fruit Grower* is very strong on the subject of drainage. "We are so freely convinced of the value of drainage," it says, "that we have said that all soils for fruit-culture cannot be drained too freely—and we repeat it—whether the land be light or heavy." The object to be sought in drainage is to ensure the disappearance of water through and down into the soil. The important results of such drainage (and especially under-drainage) are the increased mechanical action and air absorption that follow. When a soil is well drained the rain percolates through it readily and sinks tolerably fast into the soil below. Then, it must be remembered that air pressure exerts a force equal to 15 lbs. sq. in. As a result, when rain passes down air is forced to follow, and thus it is that the well-drained soil is aerated by a natural process. The air is, therefore, both drawn and forced into the soil, and the more freely this mechanical process is performed, the better for the fertility of the land.

In badly-drained land, on the other hand, the rain instead of sinking down into the earth is carried away, and thus soil æration is prevented, and the fertility brought from the air by the rain lost. Though the air collects small proportions of fertility from the air, what it does bring is valuable, and the more that can be obtained in this way the better. The rain brings down from the air carbonic acid gas, ammonia salts and Laceognitric acid, and that is why plants look so much fresher after a shower in dry weather than they did before.